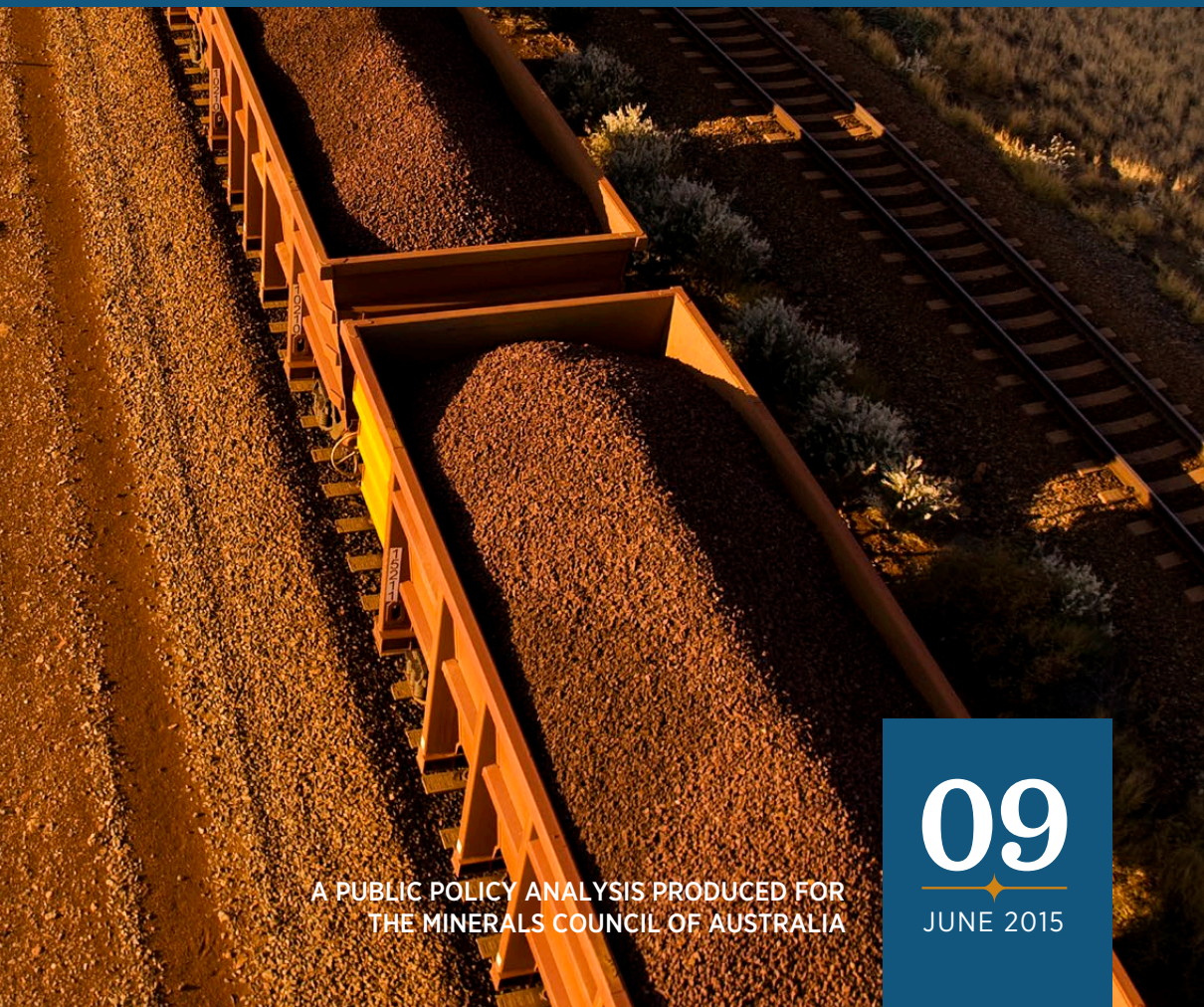
Minerals Council of Australia

Iron country: Unlocking the Pilbara

DAVID LEE



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DAVID LEE

MINERALS COUNCIL OF AUSTRALIA
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The Minerals Council of Australia represents Australia's exploration, mining and minerals processing industry, nationally and internationally, in its contribution to sustainable economic and social development.

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Introduction

Until a few years ago, Australians had only the sketchiest knowledge of the role of iron ore mining in the nation's economic life. After all, most Australians live in east coast cities and work in the services industry.

The iron ore industry's epicentre – in Western Australia's Pilbara region – is a long way away from the suburbs of Sydney and Melbourne and can appear remote in every possible sense.

All that changed dramatically in the early twenty-first century. In the wake of Australia's biggest mining boom in more than 150 years, followed more recently by a sharp fall in mineral commodity prices, the iron ore industry is now a fixture of our 24/7 news cycle. The companies and the individuals involved are household names. With its impact on everything from national living standards to government budgets to superannuation fund earnings, the market for iron ore now receives the sort of attention once reserved for Australia's unemployment or inflation rate.

Yet today's news, and instant analysis of it, can only scratch the surface. This Monograph tells the remarkable back-story of Australia's modern iron ore industry, a story that unearths much more than the inevitable cycles of the resources sector.

Ushering in Australia's modern iron age was the decision by the Menzies Government in 1960 to ease the iron ore export embargo put in place by the Lyons Government as World War II loomed in 1938. Beyond a long since moribund strategic purpose, the embargo survived in the post-war years due largely to concerns that Australia's known reserves of iron ore didn't amount to much and, in any case, were required to support the local steel industry.

A few politicians – notably William Spooner, David Brand and Charles Court – saw something more expansive in the prospects of an iron ore export industry. The period from 1938 to the early 1960s is traced in section 2.

The relaxation of the embargo paved the way for driving ambitions of prospectors, geologists, business visionaries and, not least, the industrial ambitions of Australia's former enemy, Japan. Lang Hancock's discoveries in the Hamersley Ranges in the early 1950s would prove merely a foretaste of things to come. Along with Hancock and his partner Peter Wright, prospectors Stan Hilditch and Garrick Agnew were instrumental in fostering the interest of mining companies in the Pilbara iron ore deposits, while geologists like Haddon King and Bruno Campana verified and extended the efforts of the prospectors. Soon, as set out in section 3, places like Goldsworthy, Mount Tom Price, Mount Newman and Robe River moved to the foreground as the Pilbara mining companies took shape.

Section 4 traces the establishment of these companies and their endeavours to get the foundation Pilbara projects off the ground. Securing business backing and finance for what were some of the biggest mining ventures in Australia's history would not be easy. Among the challenges was securing contracts from Japan for the sale of ore over long periods of time in order to justify financial institutions lending the capital required for construction and future mining operations. Henceforth the Pilbara iron ore industry developed in close association with the rise of the Japanese steel industry. And while American capital and know-how would figure prominently in getting the Pilbara projects off the drawing boards, the central role of Australian capital and management should not be underestimated.

Building the infrastructure of an iron ore industry in the Pilbara was a colossal challenge, one described as like building a 'state in miniature'. In reality, very little was small in scale as outlined in section 5. The Pilbara companies constructed not only mines, ports and two of the biggest private railway systems in the world but also essential community infrastructure – from power and water supply to schools, post offices, shopping centres, roads and suburban street lighting. The Snowy Mountains scheme is held up as the benchmark of Australian engineering and technological ambition and prowess in the twentieth century. The foundation Pilbara projects, constructed by private enterprise and over a much shorter time period, are at least a comparable achievement.

Economic volatility and a slowdown in world economic growth in the 1970s would undercut the more optimistic hopes and dreams of the previous decade. The cresting of the Japanese steel industry below

earlier forecasts symbolised the more constrained environment facing Australia's iron ore industry. These changing fortunes extended into the 1980s and 1990s with the Australian industry often working at below full capacity. A long period of low prices would have important implications for the structure of the industry and its labour relations. These years of changing fortunes are covered in section 6.

Section 7 focuses on the transformation of the iron ore industry in the wake of China's rapid growth and industrialisation in the early twenty-first century. China's demand for iron ore to feed its surging steel blast furnaces propelled Australia's biggest mining boom in 150 years. In the process, iron ore became Australia's largest export industry. As the living standards of Australians rose off the back of the boom, so too did the political and corporate stakes surrounding the Pilbara's red riches. New players entered the industry. State and federal governments battled over gains. Indigenous Australians, a group long excluded from the world of mining deals, were now included for the first time.

The final section offers some concluding reflections.

A theme running through this Monograph is that there was nothing inevitable about the Pilbara becoming the jewel in the crown of Australia's mining industry. Those eager to fall back on the providential nature of our resource endowments or mere 'luck' obscure much more than they explain.

In the early years, projects hung in the balance, whether by virtue of political or commercial factors or the sheer scale of the engineering and technological hurdles that had to be overcome. The reaction encountered by one prospector in the early 1960s – that Pilbara iron ore was a cheap commodity, too far from the coast – illustrates why the temptation to 'read history backwards' should always be resisted. Similarly, there was nothing ordained about the industry's survival through the long, grinding decades of low prices at the end of the twentieth century.

In his book *Mining in World History*, Martin Lynch notes that 60 years before the Pilbara's transformation into one of the world's great resource provinces, Herbert Wootton, a government geologist, declared it 'iron country'.[1] Lynch writes that for a long time nobody cared; the location was far too distant and the terrain far too difficult to justify further inquiry.

How that changed is one of the great stories of Australia's modern economic history.

SECTION

02

Lifting the embargo

SECTION 2

Lifting the embargo

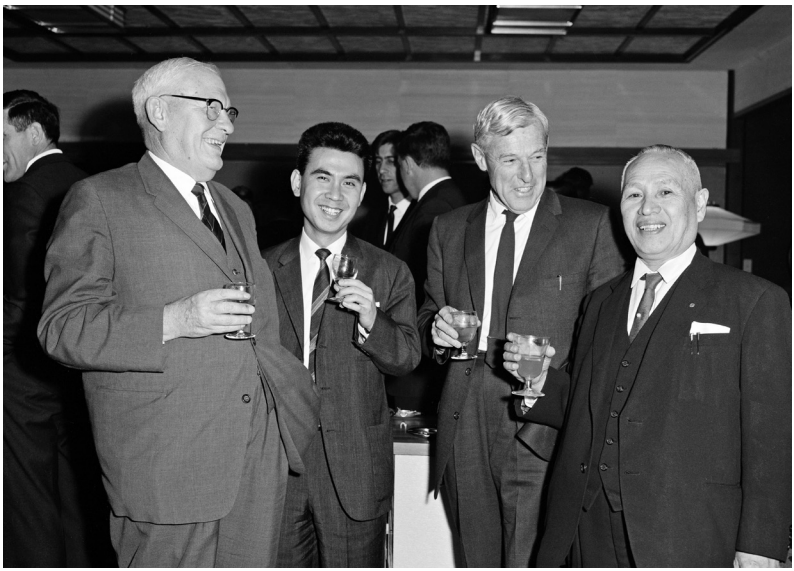
On 22 February 1960 John McEwen, Australia's Deputy Prime Minister and Minister for Trade, announced that the Australian Government was abolishing the licensing of imports.

The Menzies Government had put this regime in place in 1952 to protect Australia's precarious balance of payments. Imports worth £800 million a year, he declared, would no longer be licensed. In support of the decision, McEwen commented that '[o]ur external trade and payments position is one of considerable strength. Our overseas reserves are high and our export earning prospects good'.[2]

In the ensuing months, however, imports rushed in, exports could not keep pace and Australia's external reserves plummeted. Prime Minister Robert Menzies, who was forced to introduce a corrective mini-budget in November 1960, emphasised that a major element of remedial action had to be 'the opening and developing of overseas markets, not only for wool, wheat and meat, but also for processed and manufactured goods'.[3]

Adding to Menzies' worries were the European Economic Community's (EEC) bid for rural self-sufficiency through its Common Agricultural Policy and the British Government's request to be admitted to the Common Market in 1961.[4] These developments threatened Australia's traditional markets for rural exports. Menzies' vision remained, nonetheless, for the expansion of agricultural exports and the development of trade in manufactured products. He did not highlight possibilities in the mining industry which, after its glorious heyday in the nineteenth and early twentieth centuries, had slipped into slumber.[5]

One federal minister who did see the potential of mineral exports was the Minister for National Development, Senator William Spooner. Spooner, supported by his departmental secretary, Harold Raggatt, won two arguments



National Archives of Australia: A1501, 4927/1.

■ Sir William Spooner (left) and Sir Harold Raggatt (second from right) meeting representatives of a Japanese commercial delegation at a reception in the Japanese Embassy, Canberra, February 1964.

in Cabinet in support of mining in 1960 and 1961. One was the decision announced on 8 March 1961 to provide federal money to improve loading and berthing facilities at the coal ports of New South Wales. The other was the decision in November 1960 to relax the federal embargo on the export of iron ore which had been in force since 1938.

In 1937 most of the mining of iron ore in Australia was in the Middleback Range of South Australia. By that year, however, iron ore deposits in Yampi Sound in Western Australia had begun to attract international interest. The British company, H.A. Brassert, obtained a lease to a Yampi Sound deposit on Koolan Island from which it proposed to sell 1 million tons per year to its parent company, the Nippon Mining Company of Japan. At a time when Japan was at war with China, the news alarmed Australian Prime Minister Joseph Lyons, Attorney-General Robert Menzies and the Minister for the Interior John McEwen.

For strategic reasons the Lyons Government decided to prohibit export of Australian iron ore on 18 April 1938. The Commonwealth's

Geological Adviser and a former Foundation Professor of Geology at the University of Western Australia, W.G. Woolnough, gave Lyons' policy an economic rationalisation. He reported to government in 1938 that Australia would run out of iron ore in little more than a generation unless known reserves of accessible, high-grade iron ore were conserved.[6] Two years later, Woolnough advised that Australia only had, at its maximum extent, 350 million tons of accessible iron ore after conducting a survey with the states.[7]

Though the strategic motive for the iron ore embargo became irrelevant with the defeat of Japan in 1945, the fear that Australian iron ore would one day become scarce prolonged the ban for a further 15 years. There were a number of reasons for the longevity of the embargo. One was that prohibiting iron ore exports outright rather than reserving known deposits acted as a strict disincentive to exploration. Another was the position of Australia's steelmaker, the Broken Hill Proprietary Company (BHP).

Though BHP was in favour of exporting iron ore in 1938, it later came to support the embargo because the export ban strengthened the company's monopoly position in the Australian steel industry and helped shield it from foreign competition. Still another reason for the continuation of the embargo was the problem of Australia's distance from markets which, while Japan's economy was being reconstructed after its devastation during the war, were in Europe.[8]

Some iron ore was discovered in the 1950s: low-grade ore in the Northern Territory and small deposits in Tallering Peak and Koolyanobbing in Western Australia and at Mount Goldsworthy on the northern fringe of the Pilbara. But these discoveries were not sufficient to alter the essential picture painted by Woolnough in 1938 about the scarcity of Australia's accessible iron ore deposits.

Nonetheless, from the middle to the late 1950s, Australian mining companies began pressing the Menzies Government to ease the embargo. The Western Australian Labor Government asked the Commonwealth Government to grant exemptions from it in the 1950s. At the end of the decade the retired federal Treasurer, Arthur Fadden, secured from the Japanese steel industry the role of purchasing agent for Western Australian iron ore in the expectation that the ban would be lifted. In response, in 1959, Spooner tasked the Bureau of Mineral Resources (BMR) to conduct another survey of Australia's iron

ore reserves and hinted to the new Liberal Premier of Western Australia, David Brand, that he would support an application from Western Australia to export an experimental small quantity of ore, perhaps 10 to 15 million tons spread over a period of five to 10 years.[9] By 1959 a body of opinion was growing among scientists and geologists that there were good prospects of finding large high-grade concentrations of hematite iron ore within the banded iron formations south of Port Hedland in Western Australia.[10]

Brand tried to force the pace of change in iron ore policy by calling a public tender for the export of iron ore from known deposits at Mount Goldsworthy and further south at Koolyanobbing in 1959.[11] The decision, which caused huge excitement in Japan, irritated Menzies. The Prime Minister told Brand that the Western Australian decision had taken no account of federal iron ore policy and that he would not grant export licenses for Western Australian iron ore. In the following year the BMR reported that Australia's reserves of iron ore were not much larger than they were in 1938. The BMR and Spooner nonetheless urged a change in federal policy to encourage more exploration for iron ore.[12] Cabinet did not find the BMR's case for change in iron ore policy compelling and urged Spooner to consult with BHP.[13] BHP's chairman, Colin Syme, advised Spooner that he did not think that the partial raising of the export embargo would establish a new export trade and reinforced the point by letting him know that BHP was then actually importing some lower grade iron ore from New Caledonia.[14]

After Cabinet deferred a decision based on BHP's advice, Brand again wrote to Menzies in October 1960 seeking federal assistance to standardise the railway between iron ore deposits at Koolyanobbing and Fremantle so as to assist BHP to establish the beginnings of a steel industry at Kwinana. In doing so Brand repeated his wish to be able to export ore from smaller deposits such as Mount Goldsworthy and Tallering Peak that would, he thought, never have been of commercial value unless they could be sold outside Australia.[15]

Brand's arguments gave some support to Spooner's push for a partial relaxation of the embargo. But some of Menzies' key advisers remained sceptical. The Secretary of the Prime Minister's Department, John Bunting, pointed to BHP's lack of enthusiasm for any change and cast doubt on Spooner's argument that allowing export of some iron ore would improve Australia's balance of payments.

National Archives of Australia: A1200 / L54374

■ Western Australian Premier David Brand dispatching the first commercial shipment of Australian iron ore to Japan via Geraldton Port on 16 March 1966.

Bunting argued against removing the export embargo from deposits of high-grade iron ore in South Australia and Western Australia (Koolyanobbing and Yampi Sound) and advised that a policy of permitting exports from smaller deposits would be a troublesome policy to administer for little gain. In the end, however, Spooner's argument won out to the extent that, though Australia's high-grade exports would be reserved, export would be permitted from smaller, or yet undiscovered, deposits at the rate of 1 million tons per annum and of no more than half of the overall proven deposits.

The partial raising of the embargo produced spectacular discoveries in the Pilbara – or rather the making public in 1961 and 1962 of deposits discovered earlier. In May 1963 Spooner secured the agreement of his colleagues for further changes to the embargo on the grounds that 'the deposits recently discovered in Western Australia are so large that the original reason for the export policy, i.e. conservation of our limited resources, has now vanished'.[16] Cabinet left in place the total prohibition on the export of ore from Yampi Sound, Koolyanobbing and the Middleback Range; removed restrictions on the

> *The partial raising of the embargo produced spectacular discoveries in the Pilbara – or rather the making public in 1961 and 1962 of deposits discovered earlier.*

total quantity or yearly tonnages from the smaller deposits, now defined as those of 5 million tons; and allowed proposals from all other deposits to be considered on their merits on a case-by-case basis.[17] The Menzies Government nonetheless insisted on retaining federal control over the granting of licenses to export iron ore and on the right of the Minister for National Development to be satisfied with the prices which mining companies negotiated with consumers. This reflected the government's desire to ward off the danger of companies being formed to mine the ore which could be subsidiaries of the Japanese steel industry and its worry that new mining companies might sell off Australian ore at uneconomic prices.[18]

At the end of 1964, BHP now decided to be part of the new export industry by pressing for permission to export ore from its properties.[19] But the strong remonstrance of BHP's competitors, which had invested large sums in proving newly-discovered iron ore deposits in the Pilbara, persuaded the Menzies Government to delay further changes.[20] The decision to completely remove the iron ore export embargo would await the new Pilbara companies negotiating initial contracts with the Japanese steel industry in 1965. Ultimately it would fall to the Holt Government to take this final step in May 1966.[21]

The end of the embargo would see iron ore take its place as one of Australia's main mineral exports, rising to become Australia's leading export in the early twenty-first century. With the assistance of a burgeoning minerals trade, Japan surpassed Britain as Australia's major export market in 1967. The emergence in the 1960s and 1970s of the coal and iron ore export industries helped to substantially improve Australia's balance of payments. Accordingly, the government was able to meet with equanimity Britain's accession to the EEC in 1973.

The vast majority of Australian iron ore exports would come from Western Australia's Pilbara. While there were other smaller areas of iron ore mining in South Australia, Tasmania, the Northern Territory and in the southern part of Western Australia, the focus of this Monograph is on the dominant Pilbara region.

SECTION

03

Prospectors and geologists

SECTION 3

Prospectors and geologists

The most famous of the Australian prospectors who stimulated the interest of mining companies in the possibility of iron ore ventures in the Pilbara was Langley George (Lang) Hancock.

The Western Australian-born Hancock had inherited two pastoral properties in the Pilbara at Mulga Downs and Hamersley. After serving in the army in World War II, he turned his attention to prospects for mining and made a number of mineral finds.

Hancock shot to national prominence in the 1960s with his sensational account of how he had found huge amounts of limonite iron ore (a lower grade hydrated iron oxide) in 1952. As he told it, he was flying his plane across the Hamersley Range in November 1952 when caught in a heavy thunderstorm. Forced to fly low beneath the clouds, he flew through a gorge where he noticed rain streaming down cliffs like walls of iron.[22] Though one of Hancock's biographers regards this account as an embellishment, what is clear is that Hancock had come to know of the presence of vast amounts of limonite ore in the Hamersley Range at some time in the 1950s, with little incentive to do much about it until the export embargo was eased.[23]

One of the contributions of the partnership between Hancock and E.A. 'Peter' Wright (generally referred to as Hanwright) to the later development of the iron ore export industry was its persistence in persuading the London-based Rio Tinto Company (Rio Tinto) to take an interest in the mineral. The history of the Rio Tinto company dates back to 1873 when a London banker, Hugh Matheson, purchased the royal Spanish Rio Tinto copper mines, 50 kilometres from Cadiz.[24] After injecting capital in the venture and building an 80-kilometre railway, Rio Tinto became one of the greatest mining companies in the world in the 1880s on the back of its Spanish property. But Rio Tinto was in eclipse in 1948 when it recruited to its ranks the lawyer Val Duncan.

Duncan had served as a British staff officer advising General

Dwight D. Eisenhower on the allied landing in France in 1944 and would later, as head of Rio Tinto, become one of the two or three most influential British businessmen of the second half of the twentieth century. Having been appointed Managing Director of Rio Tinto in 1951, Duncan sold out of Rio Tinto's Spanish operation and invested the proceeds in a world-wide expansion, including into the Rhodesian copper belt and Canadian uranium.[25] A visit to Australia in 1954 encouraged him to take an interest in uranium in the Northern Territory and to set up a subsidiary in Australia: the Rio Tinto Mining Company of Australia Limited (Rio Tinto Australia).

Hancock and Wright came to Rio Tinto Australia's Melbourne offices on 22 June 1959 and struck an agreement under which Hanwright would earn 2.5 per cent royalties from gross sales of all minerals, except manganese, from their mining tenements in the Pilbara. This was before the lifting of the embargo when manganese and not iron ore was the main attraction for Rio Tinto.[26]

In 1961, after the embargo was eased, Hancock persuaded Rio Tinto to send a company geologist, the Swiss-born Bruno Campana, to accompany Hancock to examine his iron ore finds in the Pilbara. By following a chain of flat-topped mounds over 100 kilometres, Campana confirmed that Hancock had indeed found at least 1,000 million tonnes of limonite ore.[27] Limonite ore is chemically combined with water and lower in iron content than hematite ore, but was being mined in other parts of the world as feedstock for blast furnaces in the absence of higher grade discoveries.

Campana's report encouraged Rio Tinto to join with Hancock and Wright in staking claims from the Western Australian Government to 10 temporary reserves, each limited to 130 square kilometres. This meant that they had exclusive rights to prospect in the areas covered by the temporary reserves and to a mining lease on terms negotiated with the state government if payable ore was discovered. Worried that other companies would pre-empt his finds, Hancock pressed Duncan in 1961 to come to Perth to put firm mining proposals to the Brand Government. In that year, the Rio Tinto head tried to entice Brand and Charles Court, the Minister for Industrial Development, with a plan that included the eventual building of a steel industry in Western Australia, but the government rebuffed him on the grounds that Rio Tinto had no experience in steel making.

Rio Tinto's involvement in the Pilbara might have ended there but for

■ Lang Hancock with his childhood friend and business partner Peter Wright, 1967.

Fairfax Syndication

the merger in the following year of the Consolidated Zinc Corporation Limited (Consolidated Zinc) and Rio Tinto to form Rio Tinto-Zinc Corporation Limited (RTZ), the Australian subsidiary of which was Conzinc Riotinto of Australia Limited (CRA). CRA would in the 1970s come to be Australia's largest mining house and a world-ranking mining company in its own right until the mid-1990s. Consolidated Zinc's Australian head and the new head of CRA, Maurice Mawby, persuaded Duncan to join forces with the US Kaiser Steel Corporation in prosecuting Rio Tinto's Pilbara plans. Mawby also assigned exploration in the Pilbara to Haddon King, the Canadian-educated director of exploration for Consolidated Zinc. King instructed his geologists to examine every sizeable hematite body in an area of about 27,000 square kilometres, almost nine times as large as the area of the temporary reserves granted by the Western Australian Government to Hancock, Wright and Rio Tinto. After exploring several thousand kilometres, two of King's geologists came across a mountain of rich, blue-black hematite ore between three or four miles long and up to 4000 feet

wide that turned out to have iron content of 66 per cent. In doing so they made one of the greatest mineral finds in world history.[28]

The location of the find was 40 kilometres outside the Hanwright/Rio Tinto temporary reserves and only a kilometre away from an adjacent BHP temporary reserve. The discovery of the massive hematite ore body, later named Mount Tom Price, contained 600 million tonnes of high grade ore and on its own doubled what had been the official estimates of Australia's *total* reserves of high-grade iron ore in 1960.

When the 71-year-old Kaiser Steel geologist, Tom Price, visited the Pilbara in 1962, he enthused about the sheer abundance of banded iron-ore formations containing 30 per cent ore of a lower grade type that in America was providing an increasing source of pelletised feedstock for US blast furnaces and gave his name to the hematite mountain discovered by Haddon King's geologists. Despite Mount Tom Price being outside the prospectors' temporary reserves, Rio Tinto agreed to include it in the area from which Hancock and Wright earned 2.5 per cent royalties on the free-on-board (f.o.b.) value of all iron ore sold.[29] In October 1962, Maurice Mawby wrote to a colleague that the 'whole future of Western Australian iron ore is so encouraging and the deposits so large that all of us are merely passing phases in what will ultimately be a very important and well established industry'.[30]

A few years after Hancock's iron ore discoveries in the Hamersley Range, another Australian prospector came upon a similar hematite deposit in the Pilbara, east of Mount Tom Price and some 400 kilometres from the coast. Stan Hilditch was born in 1904 near Newcastle and moved with his family to Kalgoorlie when young. His formal training included a general understanding of geology gained after three years at the Kalgoorlie School of Mines. Hilditch went through the Great Depression of the 1930s by trucking cattle to markets in Western Australia. After World War II the Sydney entrepreneur, Charles Warman, agreed to back him in mineral exploration in the west.

Hilditch roamed the Pilbara in an old Thames truck on a shoe-string budget. With an eye particularly for manganese and after travelling for about six years, the prospector stumbled on a massive iron ore deposit at what later became known as Mount Whaleback, the principal ore body of the future Mount Newman iron ore operation.[31] When informing Warman of the find, the reaction Hilditch received was not encouraging – iron ore was

a cheap commodity and the find was too far from the coast.

Later, Warman and Hilditch offered Rio Tinto an option on the Mount Newman deposits, but Rio had more than enough on its agenda with its deposits in the Hamersley Range. Similarly, Western Mining Corporation, when approached, was deterred by Mount Newman's distance from the coast.[32] Finally, the two men were introduced to executives of American Metal Climax (AMAX), which sent a mining engineer and geologist from the United States to examine the deposits with Hilditch. AMAX agreed in 1963 to purchase the temporary reserves taken out by Hilditch and Warman, on a royalty formula designed to earn them $10 million over the life of the project. While this was a considerable amount of money, it was nothing like the bonanza which Hancock and Wright had obtained from Rio Tinto.[33]

> *"In October 1962, Maurice Mawby wrote to a colleague that the 'whole future of Western Australian iron ore is so encouraging and the deposits so large that all of us are merely passing phases in what will ultimately be a very important and well established industry'."*

The Australian entrepreneur who stimulated international interest in iron ore deposits at Robe River was Garrick Agnew. Born in Perth in 1930, Agnew enrolled in engineering at the University of Western Australia in 1949 and while there developed as a competition swimmer, representing Australia at the London and Helsinki Olympic Games in 1948 and 1952. Having secured a sporting scholarship, he moved to the United States to study

psychology at the Ohio State University in Columbus. When he came back to Western Australia, he turned his attention to prospecting for minerals, forming Garrick Agnew Pty Ltd and going into business as an iron ore broker.[34] In the early 1960s Agnew developed an interest in the red faced hills and mesas in the Robe River area in the Pilbara, an area that had been surveyed half a century earlier. An officer of the Western Australian colonial government, the surveyor A. Gibb Maitland, had noted the distinctive red brown capping of the Robe River mesas in 1898 and reported to his government presciently that they might contain iron ore.[35]

Despite the deposits in Robe River being smaller and having lower iron content than other major hematite deposits in the Pilbara, Agnew persuaded executives of the Japanese trading company, Mitsui, to look at them. Mitsui's Teruji Nomura and Takashi Imai became the first people outside Garrick Agnew's circle to fly into a primitive airstrip to visit the Robe River site in 1961. The Japanese businessmen noted that the more friable Robe River ore was of a lower grade but also that it could be more easily mined and was nearer the coast than the other large hematite deposits which would later be developed in the Hamersley and Ophthalmia ranges.[36] Pure hematite ore has iron content as high as 70 per cent.

Agnew's company formed a partnership with a Delaware-based company, Howe Sound, to register in Perth a new company, Basic Materials, which acquired prospecting rights to the deposits examined by Agnew at Robe River. At the suggestion of Imai, Agnew approached the major American iron ore miner and pelletising producer, Cleveland Cliffs, a company headquartered in the state where Agnew had studied psychology.[37]

Cleveland Cliffs' Vice-President, Bill Dohnal, came to Western Australia to view Agnew's deposits first hand in 1962 and at once saw potential in them. He contemplated the possibility of being able to export 3 million tons of iron ore pellets each year. While Mount Goldsworthy was a known iron ore deposit before the easing of the embargo, Australian prospectors, Hancock, Wright, Hilditch and Agnew had been instrumental in fostering the interest of mining companies in the Pilbara iron ore deposits they had discovered and that later became the basis of successful mining projects. Important in this story, too, is the work of mining geologists, like Haddon King and Bruno Campana, who verified and extended the efforts of the prospectors.

SECTION

04

The Pilbara mining companies

SECTION 4

The Pilbara mining companies

In March 1961, not long after the federal iron ore embargo was eased, the Western Australian Government called for new tenders to mine and export up to 15 million tons of iron ore from Mount Goldsworthy.

As a result of the tender it awarded a new mineral lease to a consortium of one local and two American mining companies.

Consolidated Goldfields Australia had suggested to Cyprus Mines Corporation of Los Angeles that they submit a joint tender. In turn, Cyprus Mines had recommended that the Utah Construction and Mining Company of San Francisco be invited to participate due to their joint involvement in a Peruvian iron ore export operation. American capital and know-how would become an important element in all the foundation Pilbara iron ore projects. But this American contribution would go hand-in-hand with Australian management of mining companies, substantial Australian capital and, later, minority Japanese equity participation in mines.[38]

To win the Goldsworthy tender the three associates had agreed to establish a port (ultimately at Port Hedland), to build a three-mile causeway and also to construct a 120-mile standard gauge railway and to build two townships, one at Goldsworthy and one at the port. Starting with Goldsworthy, the Brand Government made all major new iron ore projects subject to individual agreements approved by parliament. These agreements covered all aspects, apart from environmental ones which were not considered at that time, including timetables to submit proposals and implement them, royalty rates and contributions to local infrastructure. When the Goldsworthy Associates submitted an application to the Menzies Government for an export license on 22 September 1962, they had by that time spent a considerable amount

of time and money on exploration of the deposit. This investigation emboldened them to seek to export the whole of the 64 million tons of the deposit at a rate of 4 million tons per annum over a period of 21 years. While expecting to exhaust the Goldsworthy deposit, they counted on finding additional sources of quality iron ore nearby.

In seeking to export at a rate of 4 million tons per year rather than 1 million tons per year and over a period that would exhaust the whole of the deposit, the request was completely outside the terms of the federal iron ore policy. This Goldsworthy request, combined with the huge deposits of iron ore discovered in the Pilbara by Hancock and Hilditch, prompted the Menzies Government to liberalise its iron ore policy further in 1963.

The first of the Pilbara mining companies to begin operations, the Goldsworthy partners confronted a situation where no one in Australia had any experience in the marketing of iron ore overseas. Needing recognised groups with this expertise, Consolidated Goldfields Australia relied on the two American participants, Utah and Cyprus, which jointly owned the Marcona Corporation, the operator of their iron ore mine in Peru.[39] Marcona became the marketing agent in Japan for Goldsworthy and facilitated a long-term contract with the Japanese steel mills for 16 million tons over seven years beginning in April 1966.

The Japanese, however, were concerned about Goldsworthy's nominated port, Port Hedland, with its 20 feet tidal range which prior to dredging had limited vessel size to a maximum of 5,000 tons. They would only buy ore if Goldsworthy accepted full responsibility for shipping. Goldsworthy had to operate its own tugs and maintain navigation aids, a task later sub-contracted to Adelaide Steamships. Port Hedland's limitations meant that the original sales contract with the Japanese was negotiated on a cost insurance freight (c.i.f.) basis rather than free on board (f.o.b.). Goldsworthy's first shipment of ore to Japan was 20,000 tons in 1966, paving the way for future contracts to be on an f.o.b. basis.

After the merger that established the RTZ Corporation and its subsidiary CRA in 1962, the leadership of the new mining company knew that it would take much more than £50 million to develop Mount Tom Price – a project with many times as much iron ore as Mount Goldsworthy – and that such a vast amount of capital would be almost impossible to raise in Australia.[40] Relying on the precedent in which Consolidated Zinc had joined in a partnership with the American

company Kaiser Industries to develop the Weipa bauxite deposits in north Queensland in the late 1950s, it formed a partnership with Kaiser Steel to mine the iron ore in the Hamersley Range. Hamersley Iron Pty Limited was formed in October 1962 with CRA holding 60 per cent of the issued shares and Kaiser Steel 40 per cent. Hamersley Iron initially contemplated inviting BHP into a joint venture in the Hamersley project, but the Western Australian Government deliberately framed its agreement with Hamersley to avoid this option and the Menzies Government was also thought to be against such an alliance.[41]

The arrangement with Kaiser Steel left CRA in control of the operation, made access to American capital easier and brought steel industry experience to a company which knew of the Western Australian Government's long-term objective to develop steel-making in the Pilbara. By the mid-1970s Hamersley Iron was the fifth largest company listed on Australian stock exchanges by market capitalisation.[42]

The Australian management of Hamersley Iron was led by Maurice Mawby, a man born and educated at Broken Hill who had obtained diplomas in mining, metallurgy and geology and had gone to work at a young age for the Zinc Corporation. Working for British-owned companies (first Consolidated

> *"The first of the Pilbara mining companies to begin operations, the Goldsworthy partners confronted a situation where no one in Australia had any experience in the marketing of iron ore overseas."*

■ Sir Maurice Mawby, 1964.

National Archives of Australia: A1200 / L46578

Zinc and then CRA), Mawby was an advocate of multinational but Australian-managed companies because he considered that, without the backing of overseas capital, there were many Australian mining projects that could simply not get off the ground. The first managing director of Hamersley Iron was Struan Anderson, who had previously been an engineer in the Rum Jungle uranium project. Anderson was succeeded in 1968 by Russel Madigan, an engineer with a law degree who would play a vital role in commercial negotiations with the Japanese steel industry in the 1960s.

The managers of Hamersley Iron set out to try to come to a formal agreement with the Western Australian Government in 1963. That Duncan had failed in 1961 meant that this was no foregone conclusion.[43] Hamersley's managers sought to convince the Western Australian Government that any idea of the production of Australian steel from the iron ore would have to wait until the project had recouped the vast capital costs incurred in setting up the venture through selling large quantities of iron ore. It then submitted detailed proposals to the government.[44]

On 11 February 1963, Anderson, Madigan and Haddon King attended a formal conference in Perth with Charles Court, the Minister for Industrial Development, Arthur

Griffith, Minister for Mines, and key Western Australian public servants. After this meeting, Court persuaded his Cabinet colleagues to accept Hamersley Iron's proposals.[45] By this time Court had taken over responsibility for the Pilbara development from Griffith. Born in 1911 and educated in Western Australia, Court had enlisted in the Australian Military Forces in 1940 and risen to the rank of temporary lieutenant-colonel. Returning to Perth after the war, he won the Western Australian state seat of Nedlands for the Liberal Party in 1953. Holding the seat for the next three decades he would, as Minister for Industrial Development and then Premier of Western Australia, become the politician who had the most influence on shaping the Western Australian iron ore industry.[46]

In an agreement signed on 30 July 1963, Hamersley Iron agreed to spend not less than £500,000 on preliminary investigation of the iron ore deposits and not less than £30 million on mining, transport and wharf facilities before 24 March 1968. It also agreed to submit proposals for establishing a secondary processing (pellet plant) within the first 10 years of exporting ore and, much later, to bring forward plans for the expenditure of £40 million to produce an integrated iron and steel industry capable of exporting 1 million tons of steel annually.[47] If, after reasonable extensions of time, Hamersley Iron was not able to meet its obligations, the government had the right to terminate the mineral lease and confiscate the plant, railway, wharf and town buildings. The agreement, which became law on 17 November 1963, gave Hamersley Iron temporary reserves totalling 7,008 square kilometres from which the company could eventually secure a mineral lease not exceeding 777 square kilometres.

A formidable challenge then faced the new company: to secure contracts for the sale of ore over a long time period that would justify financial institutions lending the capital required to construct the project. After Hamersley's engineers and accountants had made their assessments, they arrived at a total cost of US$88 million for the first stage of the project, a figure that would later climb to US$105 million, making the Hamersley project 'the largest investment in an initial mine project in Australian history' ($1.3 billion in today's dollars).[48]

Two rival Japanese trading houses, Mitsubishi Shoji and Marubeni-Ida, each sought to negotiate sales on behalf of Hamersley Iron. Rio Tinto preferred the former and Kaiser Steel the latter. Anderson solved the problem by inviting the two Japanese companies to act jointly on Hamersley's behalf as 'introducers' to the Japanese steel

> *In 1964 Japan was importing 28 million tonnes of ore from all sources but there was no guarantee that it would be able to take ore from all the new Australian projects.*

mills. The arrangement earned the nickname 'Marubishi'. At that time, the Japanese steel mills were taking relatively small quantities of lower quality ore from India, Malaysia and Goa. Hamersley Iron's bold plan was to convince the Japanese mills to switch to long-term contracts with Australia for immense quantities of higher grade ore carried in giant ore carriers and transported over the relatively short sea route between Australia and Japan.[49]

In September 1964 negotiations reached a critical point when the steel mills invited price proposals from all the new Australian companies, including from a joint venture now beginning operations at Mount Newman. In 1964 Japan was importing 28 million tonnes of ore from all sources but there was no guarantee that it would be able to take ore from all the new Australian projects. The imperative to reach a deal quickly prompted Anderson to offer to trim the production schedule for the Hamersley project from an original 36 months to 19 months, hoping that this astonishingly short schedule would persuade the Japanese. It did. In December 1964 the steel mills signed a letter of intent to import from Hamersley Iron 65.5 million tons of direct shipping ore over 16 years beginning in August 1966. Worth £270 million, it was the largest sales contract yet written by a company operating in Australia.[50]

The sales agreements provided Hamersley Iron the means to borrow US$120 million from banks in the United States. This sum represented two thirds of the capital needed to construct the direct shipping ore project and a processing plant to produce pellets from finer ore. The remaining capital would be contributed by CRA and Kaiser Steel. Kaiser Steel approached its bank, the Bank of America, which in turn assembled a consortium of 11 other banks to examine the company's business case. The negotiations were complex and two of the banks withdrew because of worries about Japan's long-term capacity to take Hamersley ore and the real possibility of a glut in the market as Mount Newman and, later, the Robe River project came on stream. Another concern was the introduction by the US Federal Reserve Bank of a policy to discourage American banks from making overseas loans. Charles Court and the Federal Treasurer Harold Holt were enlisted to obtain assurances from the US Government that no such barriers would impede investment in Australian iron ore projects. These official representations helped persuade the American financial institutions to lend the funds to Hamersley Iron.[51]

Meanwhile, in June 1964 AMAX approached the Australian financier, Ian Potter, about possible partners and financing options for the Newman project.[52] Potter persuaded the Colonial Sugar Refining Company (CSR) to join AMAX with a 35 per cent stake in the Mount Newman Iron Ore Company and an option to go up to 45 per cent. CSR was then managed by James Vernon, a chemist who had risen to become general manager of the company in 1958. His company, whose virtual monopoly of sugar production had been well established by the 1930s, had diversified in succeeding decades. It had been closely associated with the Pilbara through asbestos mining at Wittenoom, 160 kilometres from Newman, and would also involve itself in bauxite mining at Gove in the Northern Territory.[53] In late 1964 CSR took the opportunity to increase its equity in the Mount Newman project to 45 per cent and in 1965 to 50 per cent, as the US Government exerted pressure against American lending abroad. The 50 per cent Australian equity stake in Mount Newman gave the project enormous prestige in Australia but also placed a huge burden on CSR to raise capital.

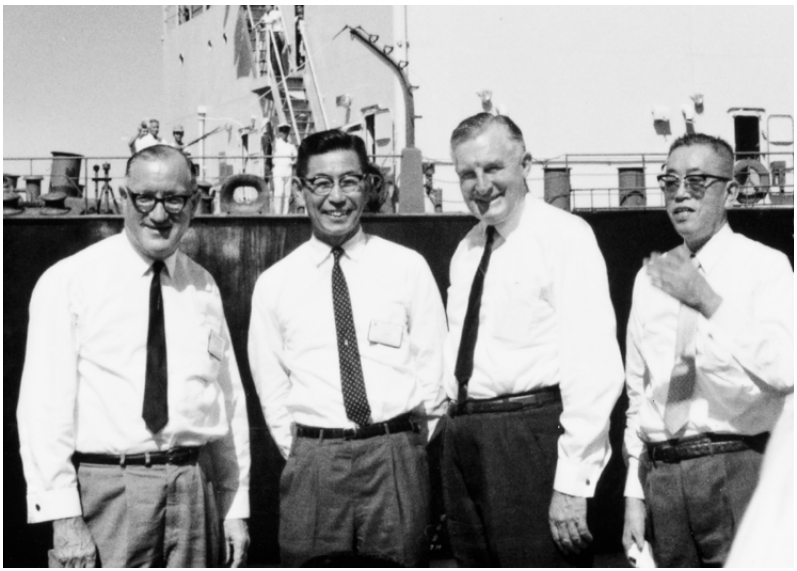
The problems facing AMAX and CSR in 1964 were formidable.[54] The greater distance of Mount Newman from the coast meant that a large

annual tonnage of ore was required to justify the huge investment needed on railway infrastructure and to deepen the harbour at Port Hedland. Early figures suggested that only about 5 million tons per year could be taken by the Japanese and this was not enough. Throughout 1965 and 1966 the project hung in the balance. A breakthrough came in March 1965 when the Japanese steel mills agreed to purchase 100 million tons of Newman ore in a long-term contract. But the terms which the steel mills extracted were stiff. The prices for Newman ore were 4.6 per cent lower than Hamersley's on quantities up to 5 million tons per year and nearly 15 per cent lower on quantities taken over 5 million tons per year.[55]

The steel mills' tactic of playing the Australian companies off against each other had forced Hamersley's price below US20 cents per contained unit of iron (the normal measure for pricing) and encouraged Newman to give generous discounts on additional tonnages of iron ore purchased.[56] Both the Minister for Trade John McEwen and the Minister for National Development David Fairbairn wanted to disallow the Mount Newman contract on the grounds that it would depress Australian prices. Indeed, McEwen wanted to void the already approved Goldsworthy and Hamersley iron ore deals, all of which he thought were underselling Australian iron ore, and to initiate a new federal iron ore policy.[57]

In Mount Newman's favour, however, was the 50 per cent Australian equity of CSR that meant that £310 million of £418 million export earnings over 22 years would remain in Australia. For that reason Cabinet deputed Menzies and Fairbairn to discuss the project with Vernon. Vernon admitted to Menzies that the Japanese had used a government-backed consortium in a form of negotiations that had 'done murder' on Australian coal companies. But he pleaded that if the government rejected the deal and forced Mount Newman to re-negotiate, the whole enterprise would fail. Vernon's advocacy in 1965 was crucial to the eventual success of the Mount Newman project. Though Cabinet lamented that 'a highly controlled and unified demand had in this case operated against a scattered and disorganised supply and so forced down the price', it approved the contract.[58]

The decision disconcerted Hamersley Iron because of the discount which Mount Newman was offering the Japanese steel industry on amounts of ore above the contracted minimum. Hamersley Iron then became collateral damage of the Newman contract later in 1965 when it offered the Japanese



State Library of Western Australia: BA2032 / 3 / 19

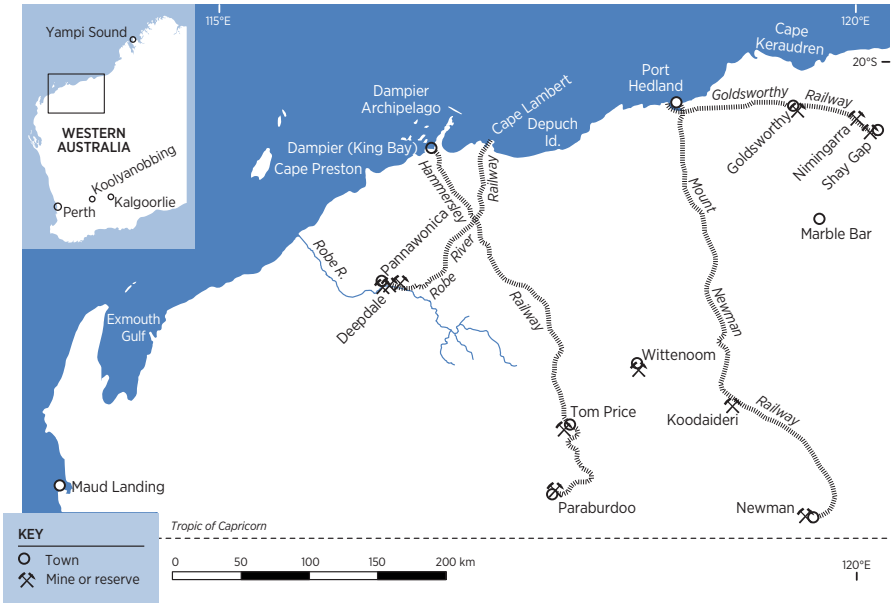
■ Sir Charles Court (second from right) marking the first shipload of Mount Newman iron ore to Japan, 1969.

price reductions on additional purchases of iron ore pellets which it needed to finance the building of an iron ore pellet plant at Port Dampier. On 30 November 1965, federal Cabinet, having only narrowly been persuaded to allow the Newman contract, vetoed the Hamersley pellet contract. This provoked an unrestrained complaint from Mawby to Menzies:

> It seems entirely unreal to me that this great industrial enterprise [the Hamersley pellet plant] bringing in 18 million dollars a year and doing so much to develop the North West, can founder on a token price reduction (in accordance with established business practice) which, in fact, vastly improved the economics of the project.[59]

The Commonwealth Government's subsequent establishment of iron ore guideline prices in 1966 further exacerbated Hamersley's difficulties. The Japanese were hostile to them and retaliated by giving further iron ore business to non-Australian suppliers, particularly in South America, as long as the Commonwealth guidelines were in place. Despite having its sales contract approved, the Mount Newman project was in dire straits by the end of 1965. The cost of the project – building a railway to Port

Map 1 **Pilbara main mines and railways up to 1980**



Hedland and further deepening its harbour – had blown out from an original US$150 million to US$200 million.[60] CSR could not meet the increased capital costs of the project and its debt financing agreement with Australian financial institutions was dependent on the sugar company retaining its 50 per cent equity.[61]

The Japanese steel companies suggested that the Mount Newman consortium should approach the Goldsworthy partners and Hamersley Iron to seek an agreement to share rail and port facilities. But both CSR and Menzies' successor, Prime Minister Harold Holt, were opposed to a Mount Newman merger with Goldsworthy, since this would mean watering down the Australian equity in a combined Goldsworthy–Newman operation. AMAX then approached Kaiser Steel, the American partner in Hamersley Iron, proposing an arrangement whereby Mount Newman would not build a railway all the way to Port Hedland but a shorter line to join the Hamersley railway so that it could share Hamersley Iron's rail and port

facilities at the new port of Dampier. Hamersley's terms were onerous: a $50 million down payment as well as a charge per ton of freight carried on the Hamersley railway.

Vernon feared that if Mount Newman accepted these terms it would potentially become a satellite of Hamersley Iron. The political pressure on Hamersley to come to an agreement was intense as McEwen intervened in the interests of CSR. Although the Mount Newman mining operation was a competitor, Duncan was prepared to negotiate with its rival because, as he told Madigan, he had a 'concept of trusteeship for the whole iron ore industry of Western Australia'.[62] McEwen's intervention, however, was to no avail.[63] The Mount Newman Mining Company decided eventually not to share facilities with Hamersley Iron on Hamersley's terms.

In the meantime, Charles Court had been working hard to persuade Cleveland Cliffs and BHP to come together in the joint development of a pelletising plant to develop Robe River limonite and BHP's adjacent properties at Deepdale. When the costs of this project also turned out to be forbidding, Cleveland Cliffs and BHP were persuaded to discuss possible participation in the Mount Newman venture with AMAX and CSR.

Because Mount Newman's production costs were too high to permit building a pellet plant, Cleveland Cliffs, as a pellet plant specialist, withdrew. But BHP stayed in the Mount Newman venture on the condition that it would manage the project. Between them, CSR and BHP retained 60 per cent Australian equity in Mount Newman. With Ian Potter's assistance, the Australian partners in Mount Newman managed the extraordinary feat of raising $100 million from Australian sources. This amounted to a revolution in Australian financing insofar as Australian institutions agreed to a substantial investment in a mineral project on the basis of anticipated cash flow rather than asset backing.[64]

One more hurdle remained to make Mount Newman viable: to receive federal approval for renegotiated contracts with the Japanese steel mills, which the federal Cabinet had only reluctantly approved in 1965. At this point, Val Duncan attempted to put Mount Newman out of business even before it started, by offering for Goldsworthy and Hamersley to fulfil the Newman contract from their already running operations.[65] Neither the Japanese mills nor the Holt Government agreed and the gentlemanly Mawby felt obliged to apologise to Vernon and BHP for Duncan's manoeuvre. Under BHP's

management, the Mount Newman Mining Company would join Hamersley Iron as two of the world's great iron ore mining companies by the end of the 1970s.[66]

Having departed the Mount Newman venture, Cleveland Cliffs turned its attention back to developing Robe River. Cliffs had signed an agreement with the state government in 1964 and formed an alliance with Mitsui to secure in 1965 a long-term contract from the Japanese steel mills to purchase 71 million tons of Robe River pellets over a period of 21 years. Difficulties in raising finance and then its dalliance with Mount Newman caused this first deal with the Japanese steel mills to fall through.

But Court remained a firm advocate of Robe River because of the industrial development that he envisaged would come with its pellet plant and because he wanted to ensure that the lower grade limonite ore should be developed, as well as larger hematite deposits, in the long-term interests of the state. Court's grand plan was that Pilbara's iron ore should be farmed with a relatively few mining companies operating, under state government supervision, in particular spheres of influence described by their geographical or economic position.[67] Cliffs eventually decided that it would build its port at Cape Lambert, the site that Hamersley Iron had earlier rejected in favour of Dampier. Though Cape Lambert was 145 kilometres from its base at Robe River and further away than its first nominated site at Cape Preston, Cliffs regarded Cape Lambert as having better prospects as a deep water port. In this Cliffs was prescient because Cape Lambert would play an important part in the success of the Robe River project.

Cliffs hoped that it could get Robe River started by reducing costs and selling sufficient annual tonnages of pellets and sinter fines to make the project financeable. Early in the project Cliffs had dismissed the possibility of Robe River fines being suitable for export because they contained between nine and 10 per cent water. But tests in 1965 had shown that 'preparation' of fines by heating and not proceeding to pelletising would still make them suitable blast-furnace feed. This development would also be crucial for the long-term success of the Robe River project.

The path to an agreement with the Japanese steel mills was paved at a meeting in Sydney between Court and the powerful managing director of Fuji Iron and Steel, Saburo Tanabe, in November 1967. At that point an argument was going on in the Japanese mills about whether sinter fines or pellets were better for the production of steel, and

some of the steel mills thought that the Robe River project should be passed over altogether. Court convinced Tanabe that the Robe River project should be regarded – with Goldsworthy, Hamersley and Mount Newman – as one of the four foundation Pilbara iron ore projects and given preference over other possibilities. Tanabe accepted Court's arguments and personally undertook to be the co-ordinator with the steel mills in putting together the tonnages of pellets and fines that would make Robe River viable.

Tanabe was as good as his word. In the months from December 1967 to February 1968 he persuaded the mills between them to agree to purchase an annual package of pellets and fines, subject to the mills being satisfied, through sintering tests, with the quality of Robe River fines. Though Hamersley's Madigan was staggered by the immensity of Tanabe's offer, it was still not sufficient to finance Robe River. For the rest of 1968, Cliffs sought to increase the tonnages and prices, and negotiations bogged down as the Japanese steel mills sought assurances on the quality of Robe River pellets. During this time Cliffs became nervous about the ability to hold its then major partner, the US shipping magnate and multi-millionaire Daniel Ludwig, and Tanabe's confidence in Robe River's prospects waned.

In late 1968 Tanabe recommended

> *"Under BHP's management, the Mount Newman Mining Company would join Hamersley Iron as two of the world's great iron ore mining companies by the end of the 1970s."*

that Robe River be delayed for a few more years. For Cliffs and Charles Court that would have meant the end of the project and they persisted in pressing the Japanese mills for an agreement. Finally, on 28 April 1969, the Japanese steel mills signed what at the time were the world's biggest iron ore sales – contracts worth $1.37 billion in 1969 dollars (worth over $15 billion in today's dollars). The mills agreed to purchase 87.7 million tonnes of pellets over 21 years and 73.4 million tonnes of sinter fines over 15 years.[68]

The sales contract permitted work to begin on a construction project costing $274 million (about $3 billion in today's dollars) and completed in 1972. After the Ludwig organisation withdrew from the project in 1969, Australian participation, through an Australian public company, Robe River Limited, increased. Ultimately, Cliffs Robe River Iron Associates would comprise Cleveland Cliffs through its Australian subsidiary (30 per cent), Mitsui Iron Ore Development Company (35 per cent), Robe River Limited (35 per cent) and Mount Enid Iron Ore Company (5 per cent). The combined Australian equity through Robe River Limited and Mount Enid Iron Ore Company (a Garrick Agnew vehicle) was 40 per cent, while Japanese equity was the highest of any of the Pilbara iron ore projects. Ludwig had separately entered into an agreement with the Western Australian Government to develop smaller resources at Nimingarra, east of Mount Goldsworthy. In 1971 these deposits were acquired by the Goldsworthy partners.

The Pilbara iron ore industry developed in close association with the rise of the Japanese steel industry so that by the end of the 1970s about half of the iron ore imports flowing into Japan were Australian and three quarters of Australia's iron ore exports were going to Japan. Elsewhere, some sales went to the emerging South Korean steel industry, some to European steel mills and inaugural sales to the then relatively tiny Chinese market.

SECTION

05

A state in miniature

SECTION 5

A state in miniature

The Pilbara extended across the north of Western Australia occupying 20 per cent of the total area, but with only 4 per cent of the state's population.

Building the infrastructure of an iron ore industry in the Pilbara – ports, mines, power stations, water supply systems, townships for workers and high quality standard gauge railway systems crossing numerous large rivers prone to annual cyclonic flooding to transport the ore – was a colossal challenge. No funding, state or Commonwealth, was available for infrastructure in a region that lacked facilities taken for granted elsewhere in Australia. What was required was 'something like creating a state in miniature' in Western Australia's north-west.[69]

The task was even greater when the harsh Pilbara climate is appreciated – high temperatures and very low rainfall apart from unpredictable cyclones. In 1961, the region's population (excluding Aborigines) was put at only 3,243 people. The main townships at Port Hedland, Roebourne, Marble Bar, Nullagine and Wittenoom were all small and linked by unsealed roads.[70]

When Rio Tinto first contemplated the feasibility of operating a large mining operation in the Pilbara hinterland in the early 1960s, inland freight costs were a major disincentive. It was not clear at that time whether owning a private railway would even be possible and the known costs of rail transport elsewhere in Australia were discouraging – sixpence a ton-mile from Broken Hill to Port Pirie and about the same from Mount Isa to Townsville. However, a 1962 study by Rio Tinto engineers indicated that a privately-built railway in the Pilbara could operate at twopence a ton-mile. These cost estimates made iron ore mining operations located hundreds of kilometres inland a viable proposition.[71]

Armed with its sales contract, Hamersley Iron in 1965 set about the Herculean task of building a 1.435-metre standard-gauge track from the mining site at Mount Tom Price to the port over a distance of nearly 300 kilometres requiring major bridgeworks. Then the heaviest track ever to be built in Australia, it was designed to support two diesel-electric locomotives each hauling about 150 wagons carrying 15,000 tons of ore. Building the railway required installing 650 metal culverts at 375 locations on the main line, constructing 16 bridges, excavating 1.6 million cubic metres of rock, and hammering more than 5 million dog-spikes into the track. Alan Trengove has described completing the main Hamersley railway in about one year as 'one of the major engineering achievements in Australian history'.[72]

With its later extension from Mount Tom Price to Paraburdoo, the Hamersley railway covers a distance of 386 kilometres, longer than the distance from Melbourne to Albury. Despite the necessity for a large outlay on operating and maintenance costs, the Hamersley railway was a vital ingredient in the rise of Hamersley Iron as one of the world's great iron ore mining companies. Shifting ore in the 1970s at about 1 cent per tonne mile compared favourably with rail freight costs in North America of between 2.5 cents and 6 cents per tonne mile and about 6 cents for bulk cargo on Australian state railways.[73]

Building the Mount Newman railway set even greater records because of its longer distance of 450 kilometres, though over more even terrain. Crews manned substantially by Thursday Islanders, experienced from work in Queensland and then on the Hamersley railway, laid 62,000 tons of track constructed from BHP steel, built 25 bridges, nine miles of culverts and made deep cuttings through hard rock. One reckoning was that enough timber was employed on the Mount Newman railway to build 10,000 average homes.

The construction of the Hamersley and Newman railways, as well as the earlier Goldsworthy railway and the somewhat later Robe River line, marked a spectacular period of rail building in Australian history. David Brand remarked that while railway transport appeared to have been eclipsed in Australia in the middle of the twentieth century, about 2,000 kilometres of track was laid in a short period of about six years in Western Australia.[74] The railway systems built by the pioneer Pilbara companies in the 1960s and early 1970s form the basis of the Rio Tinto and BHP Billiton railway systems, two of the biggest privately-operated networks in the world.

■ Thursday Islanders laying the Mount Tom Price to Dampier Railway, 1966.

National Archives of Australia: A1200/ L54806

When it came to ports, the mining companies looked at a minimum at facilities able to handle ships of 40,000 to 60,000 ton capacity to transport Pilbara iron ore and there were none of that size. Hamersley Iron began its examination of possible ports in 1962 and studied sites including Exmouth, Depuch Island, Maud Landing, Cape Keraudren and Port Hedland. From the start, Struan Anderson aimed at avoiding sharing a port and railway system with competitors with a view to delaying the start of those competitors or keeping them out altogether in the hope of selling a higher tonnage of iron ore.[75] In mid-1962 Anderson assigned the Consolidated Zinc subsidiary, Central Engineering Services (CES), to oversee port planning for Hamersley Iron. CES had to deal with two problems: first that the Pilbara region was swept by cyclones in the summer months and secondly that the region did not then have any ports capable of handling ships larger than a few thousand dead weight tonnage (dwt).

CES chose the Royal Netherlands Harbourworks Company, which was building a port for bauxite in Weipa for Comalco, to undertake

> *The construction of the Hamersley and Newman railways, as well as the earlier Goldsworthy railway and the somewhat later Robe River line, marked a spectacular period of rail building in Australian history.*

a new study. The Dutch company narrowed the choice to King Bay (now known as Parker Point at the Port of Dampier) and Cape Lambert. CES recommended Cape Lambert rather than King Bay, whose rocky hinterland and three kilometres of salt flats had the disadvantage that a railway would have to take an uphill gradient on the last stage of its approach. Anderson, however, preferred King Bay on the grounds that it was sheltered by land mass and islands, while also having more potential for expansion and a greater amount of land space for harbour works. In the end, an independent arbitration panel headed by James Bissett, the general manager of the British Phosphate Commissioners, came down in favour of King Bay (later Dampier) in December 1963.[76]

Some experts in the early 1960s doubted that it would be possible to produce a viable iron ore port on a coastline such as the Pilbara's, which was subject to high tides and cyclones. But the CES engineers felt they could succeed if they took some essential precautions. One was to batten down all moveable parts on the wharf. Another was to design for waves to pass underneath the wharf rather than break over it. Because waves at Dampier were known to reach 11 metres, the lowest part of the platform was therefore fixed at 12 metres. The consequence of this was that when King Bay was

dredged to a depth of 15 metres, the platform would be 27 metres high. This in turn meant that the Japanese-engineered, 500-tonne ship loader, which poured iron ore into the holds of berthed ships, almost reached a height of sky scrapers at 50 metres.[77]

Construction of the port at Parker Point, Dampier, commenced in January 1965 and was completed in 1966. CES engineers recognised early that East Intercourse Island off King Bay was an excellent site for a second berth. Kaiser Engineers and Constructors Incorporated carried out the construction of facilities on East Intercourse Island, excavating and relocating 3 million tonnes of rock that would be replaced by 31,000 cubic metres of reinforced concrete and 11,000 tonnes of structural steel. Ore was carried by a 2,690-metre long conveyor belt from the mainland to a stockpile area on the island. There two electronically-controlled stacking machines distributed the ore into eight piles which would be shifted by conveyor to the loading wharf 214 metres offshore.[78]

Completion of the facilities on East Intercourse Island in 1972 more than doubled Dampier's capacity. The improvements to the port of Dampier also accommodated ships with ever increasing tonnages. In the period up to 1976, the ship with the largest tonnage was the *Arafura Maru* which carried 165,597 tonnes of ore. In 1984 the *Shinho Maru* was loaded at East Intercourse Island with the first cargo greater than 200,000 tonnes to be despatched from any Australian port.[79] The improvements also allowed quicker turn-around. In 1975, for example, 412 ore-carriers visited Port Dampier, 177 berthing at East Intercourse Island and the rest at Parker Point with a 160,000 dwt vessel taking on average 36 hours to berth, load and depart.[80]

While Dampier was the first new iron ore port to be constructed, the Western Australian Government encouraged the other companies to consider Port Hedland, then an established but sleepy pastoral port carrying vessels limited to less than 5,000 tons capacity. As late as 1965, vessels entering Port Hedland had to wait until the tides of about 1.5 metres covered a rock bar five kilometres from the shore.[81] The challenge facing the Western Australian Government and the Pilbara mining companies was whether what until then was a small, tidal port could transcend its huge natural limitations.

In 1961 Court for one had abandoned hope that Port Hedland could be transformed into a deepwater port and contemplated alternative sites such as Depuch Island, 100 kilometres west of Port Hedland, and Cape Keraudren,

129 kilometres to the east.[82] In 1963, however, when the Goldsworthy partners had received permission to export 4 million tons per year, they persuaded the Western Australian Government to allow it to develop Port Hedland, one of its advantages being that it was already an established township of about 1,000 people.

The Goldsworthy Associates took on the tasks of building port facilities on Finucane Island adjacent to Port Hedland and dredging the harbour and approach navigation channel to the port. One of the Goldsworthy partners, Utah Construction and Mining Company of California, was awarded the contract to construct the port facilities.[83] Utah employed a 300-ton cutter suction dredge, *Alameda*, which, when it was first built in 1958, was the most powerful dredge in the world. The *Alameda* successfully dredged a 4.5-mile channel to a depth of 29 feet and a turning circle to handle ships of 60,000 tons capacity. Dredging commenced in July 1965 but faced heavy going as the teeth of the dredge cutters were repeatedly worn down by the hardness of the rock. Despite a tropical cyclone shutting down the program, work was sufficiently completed for the 30,000-ton carrier *Harvey S Mudd* to enter the partly dredged channel on 23 May 1966. Some 11 days later, on 3 June 1966, the ship sailed for Japan with a first shipment of 25,000 tons of iron ore from the Pilbara. After 26 months of dredging the inner harbour and approach channel, Utah completed its dredging contract for Goldsworthy in September 1967.[84]

When the Mount Newman joint venture was revived in April 1967, the Bechtel Pacific Corporation was appointed construction administrator. The Newman partners agreed to establish a ship-loading complex and industrial facilities at Port Hedland's Nelson Point. On 21 June 1967 they announced that they had awarded the biggest dredging contract ever let in Western Australia to deepen Port Hedland to accommodate ships up to 100,000 tons. The Newman partners awarded the work to a joint venture between the already-proven Utah and the Japan Industrial Land Development Company (JILD). The companies employed the *Alameda* and an identical Japanese dredge *Kokuei Maru* which arrived from Japan in August. The dredges were employed to remove some 11 million cubic yards of spoil from the approach channel and harbour off Nelson Point and to use some of the spoil to reclaim 160 acres of flood land and mangrove swamp on Nelson Point in order to establish Mount Newman's industrial area to a height of 30 feet above low tide.

■ The jetty at Cape Lambert, 1972.

National Archives of Australia: A12111, 1/1972/10/39

The Utah–JILD joint venture began work on Port Hedland harbour on 12 September 1967 and, by January 1969, the wharf and ship loading facility at Point Nelson had been commissioned and dredging had proceeded sufficiently to accommodate 100,000 ton carriers. In April 1969 a new contract was let to further deepen the approach channel so that vessels up to 315 metres in length and 185,000 dwt could be admitted.[85] By 1971, Port Hedland had become the largest export port in Australia, an astonishing transformation. The Western Australian Government was prompted to transfer administration of the port from the Harbour and Light department based at Fremantle to the Port Hedland Port Authority which assumed exclusive control from 15 June 1971.[86] The Port Authority, on which sat nominees from Mount Goldsworthy and Mount Newman companies, employed helicopters to transfer pilots and improve the operation of a port subject to large tidal movements and coping with a massive increase in vessel sizes.[87]

An Australian, Harold Clough, won a bid to build the jetty at Cape Lambert from the Cleveland Cliffs operation at Robe River. Born in Western Australia in 1926, Clough won a Fulbright Scholarship to study at the University of California, Berkeley, in the 1950s. On his

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>
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return to Perth in 1954 he joined J.O. Clough, the building firm begun by his father in 1919 that later evolved under his leadership into the multidisciplinary engineering and construction organisation, Clough Limited. Harold Clough's bid for the jetty was about one third of its nearest competitor – approximately $13 million as opposed to $33 million. The secret to Clough's success was his vision of the jetty. Forming an alliance with the Royal Netherlands Harbourworks Company, Clough proposed a structure supported by A-frame steel piles. While Clough's competitors were sceptical about the design, he and his Dutch partners argued that the steel piles would be sturdier than some of the land-backed structures built elsewhere. Their idea was essentially to build a longer jetty which stretched further out to sea and was less costly to dredge as opposed to building a shorter jetty with higher dredging costs closer to shore.[88]

The jetty which the Clough-Netherlands Harbourworks team eventually constructed was, at more than 2.6 kilometres, the second longest in Australia. At 19.9 metres above 'Indian Spring low water', it was also the tallest in Australia and indeed one of the tallest in the world. The original $13 million dredging contract extended to $25 million as the Robe River companies realised that they needed to accommodate

ships of 150,000 tonnes rather than 60,000 tons. To handle such ships, the dredged water depth at the jetty had to be about 18 metres, meaning that the total height of the structure from the seabed to the deck was almost 40 metres, the height of a 15-story building.

As John McIlwraith has pointed out, there were major benefits to this over-engineering. The loaders of the bigger ships which berthed at Cape Lambert could be more easily manoeuvred because of the jetty's extra height. In 1984, after a new 16-metre deep channel was opened, 207,704 tonnes were loaded into the *Hoei Maru*, a tonnage that eclipsed Port Dampier's record in 1984. And in 1993, the biggest ship then to visit an Australian port, the 322,941 dwt *Bergeland*, was loaded at Cape Lambert.[89]

The Pilbara companies constructed not only mines, ports and railway systems but also the manifold functions and services of developed communities such as power and water supply, schools, post offices, shopping centres, roads and suburban street lighting. By the 1970s three iron ore ports, Port Hedland, Dampier (and its township Karratha) and Cape Lambert were operating and new townships dotted the Pilbara – Mount Newman the largest, followed by Tom Price, Paraburdoo, Goldsworthy, Shay Gap and Pannawonica.

Australia's Snowy Mountains hydro-electricity and irrigation complex, constructed between 1949 and 1974 by federal and state governments at a cost of $820 million, was a phenomenal achievement in terms of its mobilisation of capital and labour and engineering and technical complexity. Taken together, the foundation Pilbara iron ore projects, constructed almost contemporaneously by private enterprise between 1965 and 1973, should be seen as a comparable engineering and technological wonder of twentieth century Australia.

SECTION

06

Changing fortunes

SECTION 6

Changing fortunes

The establishment of an iron ore industry in the Pilbara in the 1960s and early 1970s was by no means inevitable.

Securing enormous trade deals from tough-minded Japanese negotiators, persuading banks and financial institutions to lend unprecedented sums of capital to Australian companies, negotiating with two levels of government, and constructing mines, railways and ports in the remote and inhospitable Pilbara had all been significant challenges for the industry's pioneers.

But assisting the industry's emergence were some notably favourable economic conditions. They included the spectacular rise of the Japanese steel industry, fixed price contracts in US dollars over long periods, access to American and Japanese capital (and, as financial practices developed, Australian capital), fixed exchange rates, cheap oil and low rates of inflation.

World steel production had risen in the 1960s at an annual growth rate of 5.7 per cent necessitating large investments in iron ore mines all around the world.[90] In the expectation of continued good times, optimists anticipated that the Japanese economy would continue on its upward trajectory with steel production growing to 150 million tonnes per annum by the mid-1970s. This prediction did not eventuate and in turn Australia's iron ore industry found its fortunes changing in the 1970s, 1980s and 1990s.

In part due to the inflationary impact of US military spending on the Vietnam War, US President Richard Nixon declared the end of the Bretton Woods system of fixed exchange rates when he announced the suspension of the dollar's convertibility into gold in August 1971. This was followed in December that year by the devaluation of the US dollar and the consequent revaluation of the Australian dollar, a measure which adversely affected mining companies whose contracts were written in US dollars.

> *Instead of reaching 150 million tonnes, Japanese steel production stayed below 120 million tonnes per annum and hovered between 90 and 110 million tonnes per annum thereafter.*

The reaching of saturation levels in developed economy steel production and more efficient steel-making technologies slowed the annual rate of growth of world iron ore consumption from about 5 per cent in the 1960s to only 1.4 per cent in the 1970s.[91] Instead of reaching 150 million tonnes, Japanese steel production stayed below 120 million tonnes per annum and hovered between 90 and 110 million tonnes per annum thereafter.

Under agreements with the Australian mining companies, the Japanese mills had the flexibility to accept tonnages 10 per cent more or 10 per cent less than those stipulated. In 1972 the mills sought reduction of tonnages and some by greater than 10 per cent. Hamersley Iron, for example, suffered a 26 per cent drop in Japanese requirements and was forced temporarily to mothball a planned rail link between Tom Price and a new mine and town at Paraburdoo until 1973.[92] At the same time, the competitiveness of the industry was impacted by the Whitlam Labor Government's revaluation of the Australian dollar in stages leading to a 25 per cent rise in the value of the currency between December 1972 and September 1973, a policy response to rising inflation.

On top of this, Whitlam's Minister for Minerals and Energy, R.F.X. (Rex) Connor instituted a regime by which all mineral sales needed

to be approved by his department. Connor incensed the mining industry by deriding as 'mugs and hillbillies' executives who had written their contracts in US dollars. The aim of his export controls, despite the hostile rhetoric, was to improve receipts from the sale of Australian resources, particularly in the coal and iron ore industries, by encouraging the companies to counter the coordinated buying practices of the Japanese steel mills by becoming more organised themselves.

Connor's aim was to organise the iron ore industry to counterbalance the economic power of the Japanese steel industry. In 1973 Australia's iron ore miners negotiated with the Japanese steel mills for the first time as a bloc and gained from the mills partial compensation for the revaluation of the Australian dollar since mid-1971. In 1974 Connor demanded that the iron ore companies seek higher prices than the companies themselves had succeeded in negotiating from the mills. While the Australian iron ore industry was able to achieve gains in 1973 and 1974 when Japanese steel production was still expanding, the system of mineral export controls on iron ore was strained when production stalled in the late 1970s.

J.D. Anthony, Minister for Trade and Resources in the Liberal–National Party government led by Malcolm Fraser, retained the Whitlam Government's export controls on iron ore in an effort to improve the Australian iron ore industry's bargaining power. In the context of falling Japanese steel production, however, the controls were not able to prevent reductions in prices and tonnages. In 1978, when a furious Anthony complained to the Japanese Government about the mills' negotiating tactics in that year, Western Australian Premier Charles Court countered that federal iron ore policy was embittering Australian–Japanese economic relations and reducing the chances of getting another mine started in Western Australia. Following Court's representations, the Fraser Government liberalised iron ore controls in 1979.[93]

Export controls on iron ore in place from 1973 to the early 1980s operated with mixed success. The assessment by Australian economist Ross Garnaut in 1989 was that:

> The Japanese steel industry, purchasing as a cartel, exercised considerable monoposony power. Australian government attempts through the 1970s and early 1980s to counter this with export price controls were largely unsuccessful, and counter-productive in terms of market share.[94]

The first Pilbara iron ore contracts had been negotiated on a long-term basis with tonnages only subject to annual agreement. Price reviews were introduced in the 1970s owing to drastic changes in the economic environment and currency volatility. Currency fluctuations after the collapse of the Bretton Woods system, a weaker global economy, the onward march of inflation and labour troubles persuaded the mining companies and the mills to negotiate annually in a system known as 'benchmark pricing' through the last two decades of the twentieth century.

On the purchasing side in the Asia-Pacific region, Nippon Steel (formed after the merger between Yawata Iron and Steel and Fuji Steel in 1970) led the buyers group, while the biggest iron ore miners, Hamersley Iron and the Mount Newman Mining Company in Australia and Companhia Vale do Rio Doce (Vale) in Brazil, tended to establish benchmark prices followed by the lesser companies. The annual negotiations came to focus not only on price but also quantities. After Japanese steel production plateaued from the mid-1970s on, this became important when the mills often cut back their intake below contracted tonnages so that negotiations had to discuss packages of prices and quantities.[95]

Despite the revaluation of the currency, Australia's inflation rate rose sharply in the first half of the 1970s, fuelled in part by increased government expenditure and a wages explosion. To illustrate how much inflation had altered the economic environment in the Pilbara, Madigan argued that if Hamersley Iron had been established in 1976, and not 10 years earlier, it would have cost $1.3 billion and required five times the company's 1975 profits to attract investors.[96]

Notwithstanding more subdued Japanese demand for iron ore, Lang Hancock continued to pursue ambitious plans to own a mine rather than simply benefit from royalties. He built on an earlier association with Daniel Ludwig who had offered to David Brand in 1964 to build a railway system linked to a super port at Depuch Island from where his bulk carriers could ship the ore.[97] Following Charles Court's rejection of the Ludwig plan, Hancock discussed with the Western Australian Government plans to develop McCamey's Monster (with the Goldsworthy partners), Mt Lockyer, Wittenoom and Marandoo (with Texas Gulf Sulphur) and Paraburdoo (sold to Hamersley Iron in 1967).

One of Hancock's most ambitious proposals was to develop the Angelas with US steelmaker Armco for an eventually-aborted

steelmaking venture.[98] In order to create an Australian vehicle for his iron ore operations, Hancock tried to persuade Ludwig to take over Western Mining Corporation. Both this and a later scheme which would have seen the Bank of America provide finance to take over CSR were unsuccessful.[99] In the late 1960s and early 1970s Hanwright cannily took up temporary reserves over major deposits which were used to bargain with mining companies, often without the knowledge of the Western Australian Government. These activities clashed with Court's notion of state-supervised 'spheres of influence' based around the four large established Pilbara projects.[100]

By the early 1970s, Hanwright had gained control of temporary reserves over McCamey's Monster (now Jimblebar), Sugar Loaf, Giles Mini, Arrowhead, Rhodes Ridge, the Angelas, Texas Ridge, Bakers Ridge and Parmelia. Following the Brand Government's loss of office in 1971, the struggle between Hancock and the state of Western Australia reached a head with the Tonkin Labor Government. The Labor Mines Minister Don May, while confirming Hanwright's temporary reserves over McCamey's Monster, Rhodes Ridge and Western Ridge, announced in August 1971 that all other areas, with the exception of Wittenoom, would revert to the state government. These areas included the Angelas

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which would later become important to the goal of extending the longevity of Robe River.[101]

Hanwright's other plans, including building a central railway system along the lines of the Ludwig plan and the intention of floating a public company, were thwarted by state government policy and by deteriorating world economic conditions in the 1970s. Some of the Hanwright temporary reserves would be developed later by the iron ore majors; in particular, Marandoo by Hamersley Iron in 1994, the West Angelas by Rio Tinto in 2002 and McCamey's Monster (Jimbelbar), officially opened by BHP Billiton in 2014. Similarly, Goldsworthy's Area C expansion failed to receive the backing of the Japanese steel mills in the 1970s and would be opened in 2003 by BHP Billiton at the beginning of the China iron ore boom.[102]

If the 1970s proved tough for the Pilbara, the 1980s have been described by John McIlwraith, one of the most insightful observers of the iron ore industry, as the years when the industry lost its innocence. The industry learnt in that decade that the world's steel industry did not owe it a living.[103]

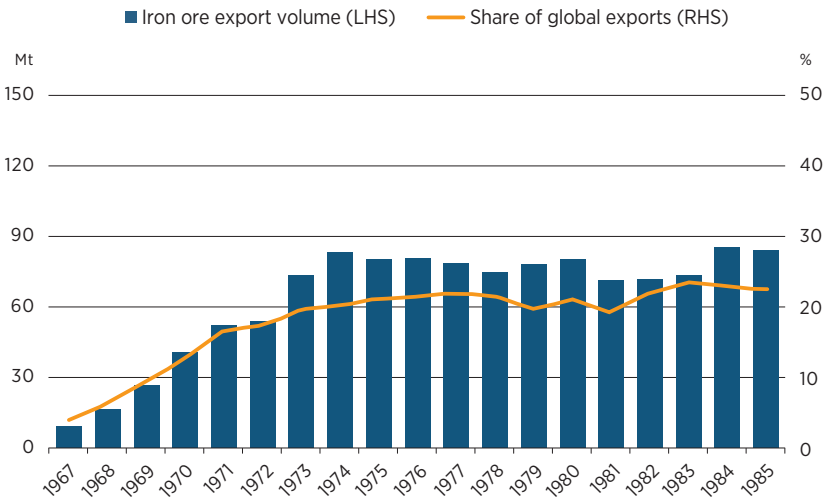
Since 1967 Australian iron ore exports had risen to peak at 82 million tonnes in 1974. They subsequently trended downward to a minimum of 71 million tonnes in 1981. Australia's share of the world export market fell from 22 per cent in 1977 to 19 per cent in 1981 (Chart 1).[104]

With the global economy sliding into recession in the early 1980s, the US steel industry (though not a buyer of Australian iron ore) worked at half its capacity, while Europe's steel industry functioned at between 50 and 55 per cent capacity.[105] Though still stronger than its counterparts in Europe and the United States, the Japanese steel industry also faced difficulties with capacity operating at 65 per cent and production falling below 100 million tonnes.

By the early 1980s, the iron ore price in real terms had already fallen almost 40 per cent from where it had been at the time the Australian iron ore industry started exporting in the late 1960s. It would drift down further over subsequent years.[106] Among the factors weighing on the iron ore price was the growth in other supply sources, particularly the phenomenal growth of the Brazilian miner Vale. Lower freight costs facilitated by technological improvements in bulk carriers also helped to depress prices on the supply side.

The global downturn in the steel industry put paid to the Western Australian Government's earlier

Chart 1 **Iron ore exports: volume and share of global exports (1967-1985)**



Source: Department of Industry and Science

aspiration of new steel industries developing in Australia from the Pilbara iron ore discoveries. Though BHP would use Newman ore in its own manufacture of Australian steel, BHP's steel division suffered poor profitability in the 1970s and 1980s. In the late twentieth century, BHP began steadily to return to its historical roots as a miner. Over time, the assumption that the Pilbara could be host to value-added processing found less and less support. The Pilbara was an expensive region where the cost differential was typically double that in Perth in the 1960s and the differential did not improve much in succeeding decades.

In 1983 the Australian iron ore industry was working at only two thirds capacity and both Mount Newman and Hamersley were forced to accept a fall in prices of 12.7 per cent, an unprecedented reversal for the iron ore giants. Over the two worst years of the international recession, iron ore prices fell by 20 per cent and these falls were only offset by a 2 per cent increase in 1985.[107] Further price reductions followed in 1986 and 1987.[108] Mining operations remained competitive largely due to technological improvements and the benefits of economies of scale, as well as from a declining Australian dollar.

> *By the early 1980s, the iron ore price in real terms had already fallen almost 40 per cent from where it had been at the time the Australian iron ore industry started exporting in the late 1960s.*

The Mount Newman Mining Company struggled to find capital to invest in the industry in the early 1980s and consequently was in a poor position to boost production when the world economy started recovering in the mid-1980s. As a result of production problems at Mount Newman, it was estimated that the company would miss out on $100 million in sales in 1985.[109] Indeed, BHP was even forced temporarily to buy iron ore from its competitor Hamersley Iron. As for BHP's great rival, from a capacity of 46 million tonnes, Hamersley Iron only shipped 29 million tonnes in 1981.

The fall in the Australian dollar provided much needed relief to miners in 1986, allowing Mount Newman to invest approximately $330 million in mine re-equipment and further dredging of Port Hedland. But while the decision to float the exchange rate in 1983 helped to cushion the impact of the slide in prices of Australia's major exports, Australian Treasurer Paul Keating's warning in 1986 of the danger of Australia becoming a 'banana republic' symbolised an era of economic uncertainty as the terms of trade dropped below what they had been in the 1950s and 1960s.

The Goldsworthy joint venturers were always restricted by the smaller size of their deposits compared with those of the other Pilbara companies. In 1973 they developed the Shay Gap/Sunrise Hill and

Nimingarra operations east of Mount Goldsworthy, requiring an extension of the Goldsworthy railway line. As production from these sites declined, and eventually ceased, deposits still further east at Yarrie would eventually be developed in 1993. By this time, there had been significant changes in the ownership of the Goldsworthy joint venture.

In 1977 Cyprus Mines withdrew from the consortium to be replaced by MIM Holdings, while Consolidated Gold Fields Australia was replaced by its British parent, Consolidated Gold Fields.[110] BHP acquired Utah's valuable coal properties in Queensland as well as a 39 per cent interest in the Goldsworthy joint venture in 1984. Six years later, BHP acquired 100 per cent of the Goldsworthy project and subsequently sold a 15 per cent interest in the project to two Japanese companies: CI Minerals (Itochu) and Mitsui. It was under BHP's management that Mining Area C – a new type of deposit called Marra Mamba that had been discovered in the early 1970s over which the original Goldsworthy joint venturers held the lease – would be developed from 2003.

In 1986, BHP also bought the holdings of both CSR and AMAX in Mount Newman, raising its interest in the company to 85 per cent. The acquisition, costing $880 million, placed the overwhelming majority of the Pilbara iron ore industry in the hands of two of Australia's largest companies, BHP and CRA.[111]

In 1972 Kaiser Steel had shed part of its equity in Hamersley Iron in two major sales, the first to Hamersley shareholders and the second to Marubeni and Mitsubishi and six Japanese steel mills, reducing its shareholding to 36 per cent .[112] In 1979 CRA increased its shareholding in Hamersley Iron to 82.3 per cent by buying the remaining equity of Kaiser Steel. In 1984 Hamersley Iron became a wholly-owned subsidiary of CRA. The chairman of CRA, Roderick Carnegie, had spearheaded an ambitious plan to 'Australianise' CRA with such success that by 1986 RTZ's shareholding in its Australian subsidiary had dipped to below 50 per cent.

Among the casualties of the industry's more challenging economic environment in the 1980s was the closure of the already marginal pellet plants of Hamersley Iron and Robe River. The energy-intensive process of making iron ore pellets had essentially meant they had become uneconomic following the second oil shock in 1979.[113]

The closure of pellet plants was more significant for Robe River than Hamersley Iron because the former had been conceived as a pelletising operation. But the Robe River Associates surmounted the

problems in a number of ways. First, they concluded an agreement with BHP in 1970 to bolster the limited reserves of 150 million tonnes that they had at Robe River with 157 million tonnes of iron ore from BHP's East Deepdale area. In return for this, BHP acquired an option which it exercised in 1975 to purchase 50 per cent of the Robe River railroad and of Cape Lambert. Armed now with 300 million tonnes of reserves, the Robe River Associates accessed a much larger source of iron ore fines. Robe's management successfully persuaded the Japanese mills to convert the pellet contracts to fines contracts at a time when the Japanese steel industry was still expanding, though not as quickly as predicted in the late 1960s.[114]

BHP further assisted Robe River in 1987, three years after Cleveland Cliffs, adversely affected by the decline in the US steel industry, had sold its stake in the Robe River mine to the Australian mining company Peko-Wallsend Ltd for US$54 million.[115] Threatened by the possibility of a takeover by entrepreneur Robert Holmes á Court, BHP decided to rationalise its iron ore operations. Deciding to concentrate on Mount Newman, BHP sold to Robe River its main Deepdale deposits, including Mesa J, which became the cornerstone of the Robe River project from the 1990s.

The Robe River Associates obtained the additional reserves and bought out BHP's rights to use its railway and port for a mere $42 million.[116] Later, the Robe River Associates expanded their operations to develop the West Angelas deposit, one of the areas of which Lang Hancock had been divested by the Tonkin Government. This deposit became operational in 2002.

Overall, however, the optimism generated by the mining boom of the 1960s gave way to a period of pessimism in the 1980s as the prices of most of Australia's commodity exports fell and the terms of trade turned against Australia. Having reached 7 per cent of Australian exports in the mid-1970s, up from virtually nothing a decade earlier, the share of iron ore in total exports drifted down to average around 4.5 per cent in the 1980s.[117]

Against the tide, Hamersley Iron in the 1980s pioneered the first new iron ore mine in the Pilbara since Paraburdoo in 1971-72. This was a joint venture with the People's Republic of China's China Metallurgical Import and Export Corporation (CMIEC) and Hamersley Holdings to develop 200 million tonnes of high-grade hematite ore over approximately 20 years at Channar.

CMIEC, an import/export corporation operating within the Chinese Ministry

National Archives of Australia: A6180 / 15/4/85/1

■ Prime Minister Bob Hawke with Chinese General Secretary Hu Yao Bang examining iron ore at Channar Mine, Pilbara, 1985. To Mr Hawke's left is CRA Managing Director (later CEO) John Ralph.

of Metallurgical Industry (MMI), was responsible in China for importing ore and associated steel-making raw materials. First proposed in 1983, construction of the project began in 1988 with the plan to mine Channar ore by open cut methods and convey the crushed ore 20 kilometres overland to Paraburdoo where it would be blended with Paraburdoo materials into lump and fines.

Like the foundation Pilbara projects, foreign capital became essential to get the project started, especially after the Australian Taxation Office ruled in 1988 that Australian banks, which had initially contemplated financing the project, would not be eligible for income tax benefits under the *Income Tax Assessment Act*. The Joint Venturers formed a jointly-owned finance company to enter into a 12-year, US$170 million debt funding arrangement with a group of 13 international banks.[118]

The industry returned to greater profitability in the late 1980s and early 1990s as the Japanese steel industry recovered somewhat and supply expanded to other Northeast

Asian markets, including Taiwan, the Republic of Korea and China.[119] But the 1990s saw the Japanese steel industry again go into decline with the Japanese economy growing annually at less than 1 per cent and moving away from heavy industry to knowledge management.[120]

Challenging market conditions through the 1970s and 1980s served to heighten the industrial relations temperature in the Pilbara. By the 1980s, time lost due to industrial disputes was the most significant factor causing production loss. Between 1976 and 1981, the four major Pilbara miners suffered 3,905 strikes and lost 5,755,126 man hours.[121]

Labour problems climaxed in the mid-1980s when the Robe River Associates took steps to challenge what it saw as restrictive work practices established over many years. In the first half of the 1980s, Robe River's profitability had held up well as a result of marketing advantages conferred by equity partner, Mitsui, and favourable spot prices. After 1985, however, the higher yen imposed new constraints on the company's profitability. In 1986, Charles Copeman, the chief executive of Peko-Wallsend, now the majority owner of the company, took decisive action challenging prevailing work practices. He did so by sacking some of his senior management, declaring all existing industrial agreements null and void and seeking to transfer the workforce from a state to a federal award. The bitter industrial dispute that followed was eventually settled in 1987 in a peace accord brokered with the assistance of the Australian Council of Trade Unions.

For some, the initiative of Peko-Wallsend in leading the attack on Pilbara work practices had been a brave action taken out of economic necessity.[122] Peko's success could be measured, as the Productivity Commission later did, by substantially improved labour productivity at Robe River after 1986.[123] For others, including Peko's Japanese partners and the then federal and state Labor governments, Peko had won a pyrrhic victory by over-reaching and in doing so endangering the reputation of the Pilbara as a reliable supplier.

In the longer term, the Robe River dispute proved to be a watershed in the industrial relations history of the Pilbara. After the dispute, Robe River's management moved its workforce from state awards to common law individual contracts in the late 1980s. Later when Hamersley Iron's workforce struck over the employment of a non-unionist in 1992, that company similarly moved its workforce to individual contracts, taking advantage of new state laws

in Western Australia which had introduced statutory individual contracts. Union power was reduced across the Pilbara, once a centre of union strength in the 1970s and 1980s. As individual contracts became the norm, BHP in 1999 followed suit.[124]

The iron ore industry underwent further rationalisation and consolidation through the 1990s and around the turn of the century. In 1995, RTZ and CRA merged into a dual listed company (RTZ-CRA) under single management although with shares maintained in different entities. The Rio Tinto Group became commonly known thereafter simply as Rio Tinto. Following a successful takeover of North Limited in 2000, Rio Tinto would become the world's second largest iron ore miner, behind only Vale.

North Limited had earlier merged with Peko-Wallsend to take up the majority position in Robe River and in 1999 had launched a bid to have the Hamersley Railway declared 'open access', which was always possible under the state agreement. In response, Rio Tinto in June 2000 announced a cash offer for all of North Limited's shares provoking strong resistance from Robe's minority shareholder, Mitsui, and from the Japanese steel industry. Overcoming Japanese opposition, Rio Tinto successfully took over North Limited and thereby became a partner with Mitsui Iron Ore Development, Nippon Steel Australia and Sumitomo Metal Australia in Robe River Iron Ore Associates, then Australia's third largest iron ore mining firm. As a consequence of the takeover of Robe River, Rio almost doubled its iron ore production and became owner of an integrated Hamersley-Robe River railway system.[125]

With market conditions remaining difficult, the drive for scale would be one of few options open in an industry generally viewed as high-volume and low-margin. The conclusion some drew was more sober still; that while-ever Australia relied on 'old economy' industries like iron ore mining, its economic fortunes would suffer.

SECTION

07

The China boom

SECTION 7

The China boom

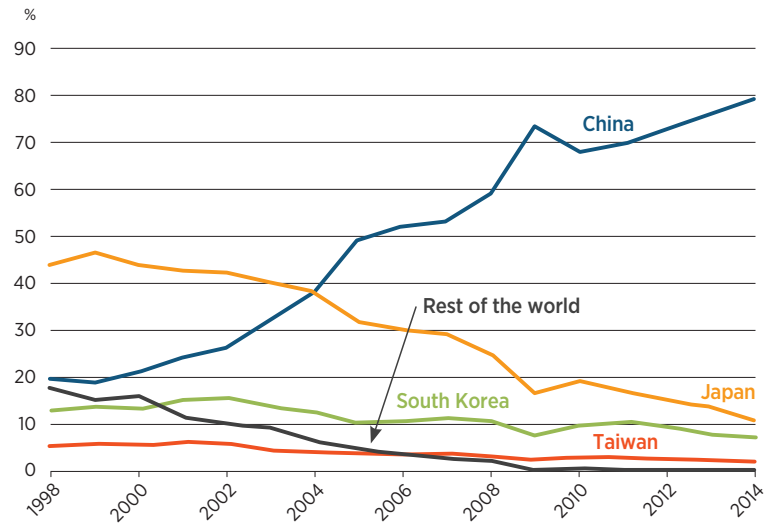
A sleeping giant until the late twentieth century, China entered into a particularly rapid phase of industrial growth at the beginning of the twenty-first century. In roughly a decade, it moved from 9 per cent of world GDP to almost 17 per cent, an unparalleled rate of growth and development in world history.

Japan and other Asian economies had grown rapidly over a short period of time through a high rate of capital formation and high productivity growth. China's growth came from a lower per capita income, lasted longer and on average exceeded the rate of growth in these economies. In the process, China became the world's fastest growing economy, the world's largest exporter and the world's largest manufacturer.[126]

Chinese steel production increased fivefold over the century's first decade. The construction of urban housing and the provision of urban infrastructure such as roads, bridges, railways, office buildings and sewerage systems generated sharply higher demand for steel-making commodities. Since China's own iron ore reserves were of lower grade and located far away from steel-producing centres on the eastern seaboard, China's steel industry turned to Australia and other suppliers to source this essential input. Imports of iron ore into China soared from 70 million tonnes in 2000 to more than 800 million tonnes by 2013 making it by far the dominant global consumer. By the end of this period, Chinese imports accounted for about two thirds of the global seaborne iron ore market.

China's growth, urbanisation and industrialisation utterly transformed the prospects of Australia's iron ore industry. Australia's iron ore exports to China were valued at $1.2 billion in 2000-01. By 2013-14, they were valued at $57 billion out of total iron ore exports valued at almost $75 billion. Over this period, the volume of Australian iron ore exports to China rose from 157 million tonnes to 651 million tonnes with China's share of Australia's

Chart 2 **Iron ore exports: volume share by destination (1998–2014)**



Source: Department of Industry and Science

total iron ore exports rising from less than a quarter to almost 80 per cent by 2014 (Chart 2).

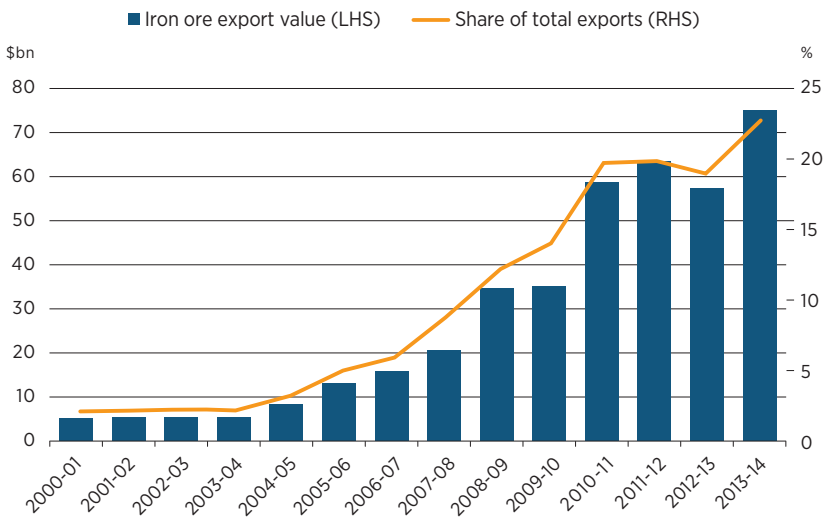
Increases in iron ore revenues in turn became a major contributor to an Australian mining boom unlike anything seen in the previous century. The share of iron ore in Australia's total exports increased from 2 per cent in 2000-01 to more than 22 per cent in 2013-14, with the industry becoming Australia's largest export earner in 2010-11 (Chart 3).

The growth in iron ore exports was mainly due to increases in export prices in the first phase of the mining boom. After falling between 2001 and 2003, prices grew on average by 23 per cent per annum between 2004 and 2011.[127] In 2010, the Governor of the Reserve Bank of Australia Glenn Stevens put this into some context:

> ... five years ago, a ship load of iron ore was worth about the same as about 2,200 flat screen television sets. Today it is worth about 22,000 flat-screen TV sets – partly due to TV prices falling but more due to the price of iron ore rising by a factor of six.[128]

While export volumes rose steadily at around 11 per cent annually between 2004 and 2011, the price surge also laid the foundations for

Chart 3 **Iron ore exports: value and share of total exports (2000-01 – 2013-14)**



Source: Department of Industry and Science

an investment boom which would ultimately turbo-charge Australian export capacity. The real value of iron ore investment in Australia grew from less than $2 billion in 2004-05 to more than $18 billion in 2012-13, helping to underpin employment growth in iron ore extraction and related activities. This modern iron age symbolised an era of extraordinary growth in Australian living standards. It has been estimated that off the back of the mining boom Australians saw their per capita incomes increase by about 25 per cent relative to US levels.[129]

The scale of the China-driven commodity 'super cycle' and the changes it would unleash across Australia's iron ore industry caught virtually everyone by surprise. It was only after 2005 that forecasters started to adjust their thinking about the scale of what China was doing.[130] At the start of the century, the Asia–Pacific market for iron ore was dormant and characterised by a few major buyers and sellers. Australian iron ore companies were understandably reluctant to risk extending their capacity given the previous two decades of modest iron ore prices. These prices had remained stable in nominal terms from the 1980s onward. In the

> *It was only after 2005 that forecasters started to adjust their thinking about the scale of what China was doing.*

wake of the Asian financial crisis and the 2001 recession in the United States, the global steel industry was widely seen as characterised by considerable overcapacity.[131]

Three companies – Vale, Rio Tinto and BHP – accounted for 74 per cent of iron ore exports to North East Asia at the turn of the century. In 2001, BHP merged with Billiton to form BHP Billiton, a behemoth which would become the largest mining company in the world. On the consumer side, the Japanese steel industry was now dominated by five companies and Korea's industry by one. The Chinese industry was less concentrated with its biggest 10 companies making up half of national production in 2000, with another roughly 650 smaller mills making up the other half.[132]

As J.D. Wilson has shown, the Chinese position in the iron ore market at the time was notably different from that of Japan. Whereas Japan had formed many joint ventures with Australian and South American mining companies since the early 1970s, China had relatively few, notwithstanding its pioneering joint partnership with Hamersley Iron at Channar. Nor did the Chinese mills initially have the same capacity as the Japanese steel companies to function as an organised group in annual price negotiations. Despite the Chinese steel industry's growing size,

the Japanese mills maintained leadership of benchmark negotiations for much of the first decade of the twenty-first century.

The take-off in Chinese demand in the first half of the 2000s gave iron ore producers unprecedented market power in negotiations as global supply struggled to keep pace with demand. Following on a 9 per cent rise in 2003, negotiated prices rose by almost 17 per cent in 2004 before an unprecedented benchmark increase of more than 70 per cent in 2005, agreed by Vale and Nippon Steel. This last increase was considered catastrophic in China whose steel industry castigated the deal as one that had been settled by Japanese firms whose declining market share meant that they were now incapable of negotiating for the North East Asian industry as a whole.[133]

In response to a sharp fall in the profitability of Chinese steel companies, the Chinese government issued a new steel policy in 2005. Its first component was to develop new iron ore suppliers, principally by encouraging Chinese steel firms to invest in iron ore projects overseas with the assistance of the state-owned banking system. The second component was the fostering of greater co-ordination between Chinese steel firms with the intention of improving the Chinese position in annual price negotiations.[134]

While the top 10 Chinese steel mills purchased iron ore under long-term contracts from Australian and Brazilian mining companies, the smaller Chinese companies bred a vibrant spot market in which the price rose to 40 per cent above the contract level in 2006. The emergence of the spot market also encouraged new iron exporters such as India to enter the market. The increasing tendency of the big Australian miners to take advantage of higher spot prices led to complaints from Chinese industry and from Chinese Premier Wen Jiabao, who in April 2006 called for iron ore contract negotiations to be put in the hands of governments.[135]

In that year Vale, which had seized the position of leading iron ore price negotiations from Rio Tinto, settled on a deal for a price rise of only 9.5 per cent that left Australian miners deeply dissatisfied. When Vale again settled on a deal for a 71 per cent increase in negotiations for the 2008 contract, this time with the Koreans and the Japanese, Rio refused to follow and pushed for higher contract prices and greater use of the spot market.[136] At this, the Chinese Iron and Steel Association (CISA) charged Rio Tinto with breaching long-established cooperative ties and called for a boycott of the company.

The 2008 iron ore negotiations were consequently extremely tense as negotiators for Baosteel, China's biggest steel company, indicated that they were in a position to slash Chinese steel production by 10 per cent and enforce a boycott of Rio Tinto ships. Rio Tinto, however, pointed out that Chinese action against Rio Tinto might lead to BHP Billiton consummating a takeover bid of Rio.[137] This merger, first proposed in 2007, would have united the world's largest and third largest mining companies. In the end, after 12 months of negotiations, Boasteel and Rio Tinto agreed on a deal – a record-breaking 96.5 per cent increase in lump ore and 79 per cent for fines. This worked out to a weighted average rise of 85 per cent for Rio Tinto and a little less for BHP Billiton.

In Western Australia, buoyant iron ore demand brought with it the entry of new players into the Australian industry. For the first time in decades, new mining companies operated in the Pilbara. The most dynamic of the new Pilbara players, Fortescue Metals, made rapid strides from grassroots explorer, to first export in 2008, before eventually becoming the world's fourth largest producer of iron ore in the space of less than a decade.

Led by Western Australian entrepreneur Andrew 'Twiggy' Forrest, Fortescue was built on the founder's optimism about China's growth potential and the success of Fortescue's geologists in finding ore by identifying a small part on the surface (the tiger) leading to much bigger deposits buried below the ground (the tail).[138] This geological method helped Fortescue to develop two major new iron ore areas in the Pilbara: the Chichester Hub and the Solomon Hub. Fortescue, after first seeking access to Mount Newman's railway system, later built a 260 kilometre railway and its own ship loading facility at Port Hedland. By 2014 its capacity had reached 155 million tonnes per annum.

A number of other players sought to emulate Fortescue, including Gina Rinehart who looked to build on her father Lang Hancock's legacy by developing her own mining operations.[139] Driven by record prices, new developments were characterised in some cases by lower grade ore deposits and even included difficult to process magnetite ores.

The global financial crisis which struck in late 2008 would help to precipitate a major overhaul of the pricing mechanism for iron ore. In the immediate aftermath, demand for steel collapsed, spot prices fell dramatically and some customers reneged on contract prices, preferring instead to purchase more

cheaply on the spot market. As the market tightened again in late 2009, producers – led this time by BHP Billiton's chief executive Marius Kloppers – advocated shorter term pricing to narrow the gap between spot and contract prices. The benchmark system formally ended in 2010 when BHP Billiton and Vale reached a deal with Chinese and Japanese mills to adjust prices quarterly on the basis of spot prices over the preceding quarter.

Another casualty of the GFC was the BHP Billiton bid to purchase Rio Tinto. It had been rejected by Rio's board and would be abandoned in November 2008 amidst acute global economic uncertainty. This uncertainty along with Rio Tinto's relatively high leverage saw the Anglo-Australian miner enter into an agreement with China's Chinalco in February 2009 to receive an equity injection. However, Rio Tinto withdrew from this deal in June 2009 amidst improved market conditions, agreeing instead to an iron ore production joint venture with BHP Billiton. This proposal too was eventually abandoned in October 2010 in the face of stiff opposition from steel producers and regulators around the world.[140]

While the GFC threatened to derail the commodities boom, China's strong and swift infrastructure stimulus ensured demand for steel-making commodities held up well. In 2011, more residential floor space was built in China in a single year than the entire residential building stock in Australia at the time.[141] Renewed demand saw iron ore and coal prices driven to new peaks, with Australia's terms of trade reaching an historical high in September 2011.

Surging prices also touched off rapidly increasing expenditure on iron ore exploration. From just $23 million in 2000-01, iron ore exploration spending increased to more than $1 billion in 2012-13.[142] Nearly all of this growth occurred in Western Australia, although South Australia and the Northern Territory also saw notable increases in iron ore exploration activity.

Among the other consequences of expanded economic horizons for Australia's iron ore industry was the cementing of improved relations between the Pilbara mining companies and Indigenous people after many years of bitter disputes. Aboriginal peoples had lived in the Pilbara for 30,000 years and had a strong, spiritual attachment to their ancestral land. When the Pilbara mining companies were first established no royalties were paid to Aboriginal peoples and the companies preferred not to train local Aboriginals.[143] The construction of 'restricted access' mining towns at Pannawonica, Paraburdoo, Goldsworthy, Shay

Gap, Wickam, Dampier, Newman and Tom Price was symptomatic of the initial exclusion of Indigenous people from the mining economy in the Pilbara.

In most respects, however, the iron ore companies were simply following the norms of the rest of Australian society and the policies of the state governments when it came to the treatment of Aboriginal peoples. Western Australian state governments were staunchly opposed to Aboriginal land rights. This was exemplified during the 1980 Noonkanbah dispute in which Premier Charles Court backed the rights of the mining company AMAX against the Aboriginal owners of a small pastoral station in the Kimberleys.

The passage of the Commonwealth *Native Title Act* 1993, following the High Court's 1992 Mabo decision, proved a watershed. The legislation provided a mechanism for Indigenous Australians to assert their rights over their traditional lands in negotiations with mining companies. Another milestone, highlighted by Professor Marcia Langton in her 2012 Boyer Lectures, came in 1995. The then Chairman of Rio Tinto, Leon Davis, threw his weight behind acceptance of native title and respect for traditional owners. This has been identified as a turning point within the mining industry, paving the way for future agreements.[144]

Native title legislation bore fruit in the Yandi Land Use Agreement (YLUA), a land-mark agreement signed in 1997 by Hamersley Iron and Gumula Corporation representing the Yinhawangka, Banyjima and Nyiyaparli people. This was the first major land use agreement in the Pilbara after the Mabo decision. The agreement, a forerunner of others, provided economic and development opportunities for Aboriginal parties through a package of benefits including employment and training, education, cultural heritage management and business development.[145]

In addition to land rights agreements, mining companies developed far-reaching initiatives on Aboriginal economic development, education and cultural heritage. As recently as the mid-1990s, less than half a percent Rio Tinto's workforce was Indigenous. Within a few years it had become one of Australia's largest private sector employers of Indigenous Australians. By 2014, more than 8 per cent of the workforce at its iron ore operations in Western Australia was Aboriginal. Since 2001, BHP Billiton Iron Ore has invested heavily in improving student school retention and completion in its host communities of Port Hedland and Newman, with linkages to

employment with the company. All major Pilbara producers have taken actions to increase procurement from Indigenous-owned businesses with one estimate that up to 150 Aboriginal businesses have been established across the Pilbara. [146]

In March 2015, in a sign of the advances made by the mining industry and Indigenous people since the *Native Title Act*, a Perth-based company, Australian Aboriginal Mining Corporation Limited, was poised to establish what was believed to be Australia's first mine owned and operated by Aboriginal people. The company hopes to establish a small open-cut iron ore mine about 70 kilometres north-west of Newman by persuading one of the major miners to haul ore to a port on its railway system.[147]

Not surprisingly, the China boom also led to new contests over the sharing of benefits between the mining companies and the wider community. Under Australian law, ownership of minerals is vested in 'the Crown' meaning, in practice, state governments. Since the establishment of the iron ore industry in the 1960s, the Western Australian government had charged mining companies royalties based on a prescribed percentage of net f.o.b. revenue, originally 7.5 per cent from lump ore and 3.75 per cent for fines. After 1960, the resurgence of mining, and the taxes and revenue that came with

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“Not surprisingly, the China boom also led to new contests over the sharing of benefits between the mining companies and the wider community.”

it, transformed the state of Western Australia and eased the sense of grievance against Canberra that had seen Western Australians attempt to secede from the Commonwealth of Australia in the 1930s. Royalties from mining helped induce the Commonwealth Grants Commission to remove its designation of Western Australia as a ‘claimant state’ from the Commonwealth in 1971.

At the start of the China boom, royalties from iron ore to Western Australia were less than $300 million.[148] By 2013-14, iron ore royalties exceeded $5.3 billion and accounted for more than 20 per cent of the Western Australian government’s own source revenue. Despite federal coffers also experiencing a windfall from higher company tax, some began to question whether royalties and company tax provided a sufficient or efficient harvest for government from the profits being earned by the miners from the sale of non-renewable resources.

In 2010, the Henry Tax Review recommended that the Australian Government impose a new resource rent tax on mining projects with the government sharing 40 per cent of the costs and profits as a silent partner.[149] The Henry review offered two options for implementing the tax: one that would replace the royalty system with appropriate recompense to the states; and the

other that would run in parallel with the royalty system so that royalties would remain and companies would be credited for their royalty payments. Australia's major mining companies were not necessarily opposed to a profits-based tax but were sharply critical of the way the Government went about implementing it.

Seizing on the Henry recommendation, Labor Prime Minister Kevin Rudd in May 2010 announced the Resource Super Profits Tax (RSPT). This would have imposed a 40 per cent tax on mining 'super profits', defined as everything above the government bond rate. The RSPT was announced without consultation with the mining industry.

The industry launched a vigorous campaign against the tax led by the Minerals Council of Australia.[150] After Rudd had been replaced as prime minister, his successor Julia Gillard negotiated a new tax, known as the Minerals Resource Rent Tax (MRRT), with BHP Billiton, Rio Tinto and Xstrata. Directed solely at iron ore and coal, the MRRT had an effective headline rate of 22.5 per cent along with a framework that took greater account of existing investments.

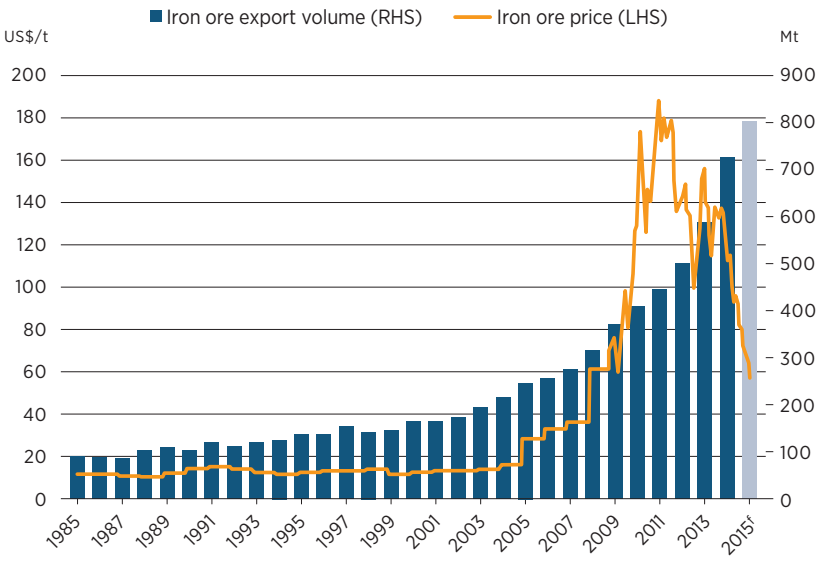
The Gillard Government estimated initially that revisions to the tax would cut expected revenue from $12 billion to $10.5 billion over four years. However, in 2012-13, its first year of operation, the tax raised a mere $310 million. After the 2013 election, the Abbott Liberal National Government implemented a commitment to abolish the tax. Looking back on the attempt to devise new taxation arrangements in the mining industry, Labor's then Resources Minister Martin Ferguson later remarked that:

> The industry would have accepted a profits-based tax. They were ready to work with us ... We lost the mining tax dispute not because of the mining industry's response but because we created the mess.[151]

By the end of 2013, it was apparent to close industry observers that the price and investment phases of Western Australia's iron ore boom had peaked. At the same time, the production and exports phase as the result of that investment was only just ramping up. From roughly 200 million tonnes at the start of the China boom, Australia's iron ore production grew 50 per cent to about 300 million tonnes by 2007. The race to claim high prices would see Australian production more than double over the next six years to exceed 700 million tonnes by 2014 (Chart 4).

Not surprisingly, other iron ore exporters – both traditional producers like Brazil as well as new competitors from Asia, Africa

Chart 4 **Iron ore exports: volume and price (1985 – 2015)**



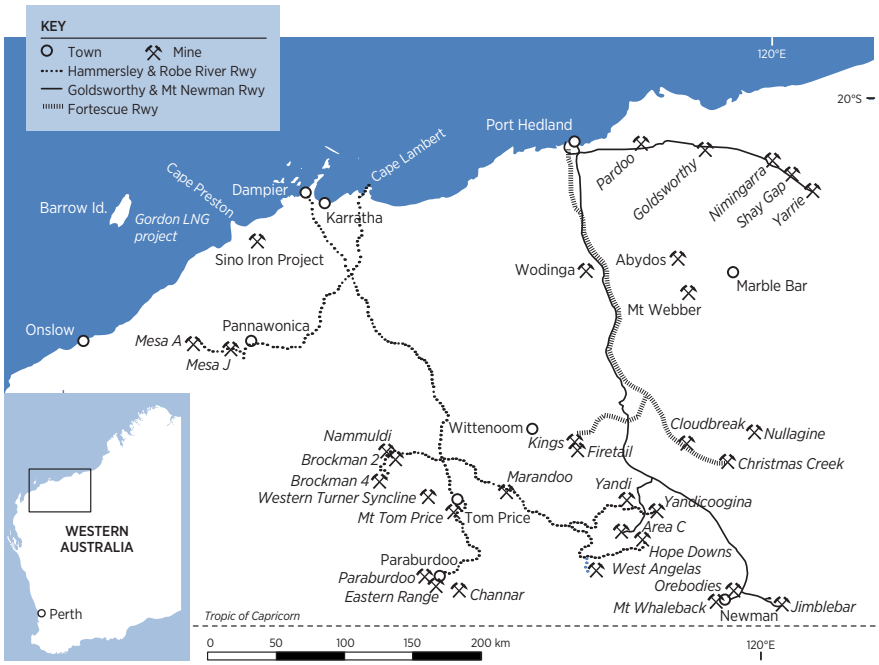
f = forecast

Source: Department of Industry and Science, IndexMundi

and elsewhere – also responded to boom conditions. New supply came on stream just as China's growth began to slow. Through 2014 and 2015, sharp falls in the iron ore price would test the survival instincts of new and existing players. As the Pilbara companies strove to reduce costs and improve productivity, headlines about 'super cycles' and soaring mining wages gave way in quick time to ones that spoke of job losses and corporate shake-outs.

Just as the iron ore price had surprised on the upside through the millennium's first decade, by midway through the second decade it was surprising many on the down side, signalling tougher times for mining and the country as a whole. Despite earlier sentiment suggesting this time would be different, no one had abolished the commodity cycle.

Map 2 **Pilbara operating iron ore mines and railways, 2015**



SECTION

08

Concluding reflections

SECTION 8

Concluding reflections

The Pilbara iron ore industry was initially shaped by the iron ore export embargo that lasted from 1938 to 1960.

The resulting disincentive for mining companies to search for iron ore left the running in exploration to independent Australian prospectors who played a crucial role in the identification of deposits.

A balance of payments crisis in 1960-61 saw the Menzies Government relax the ban. While the Menzies Government was not particularly looking to mining to help address Australia's economic problems, minerals exports unexpectedly contributed to healthier balance of payments from the late 1960s onward. The rise of iron ore and coal in the late twentieth century proved particularly important to the Australian economy given the decline of wool as an Australian export staple.

BHP's initial reluctance to enter the iron ore export business meant that overseas-owned mining companies and CSR would be prominent in the first Pilbara projects. The Pilbara mining companies, later joined by BHP, faced the daunting task of securing long-term contracts for the sale of ore, obtaining huge sums of capital and completing the building of a 'state in miniature' in the remote Pilbara. The completion of the foundation Pilbara projects was assisted by benign economic conditions, particularly the phenomenal rise of the Japanese steel industry in the 1960s. But success was not inevitable and, as we have seen, eventually profitable projects like Mount Newman and Robe River hung in the balance.

Fluctuating exchange rates, the end of the long post-war boom and, in particular, the flattening of growth in the Japanese steel industry signified much tougher times for the Pilbara producers in the 1970s. A steep global recession in the early 1980s further eroded the optimism that had characterised the 1960s and over many years the big iron ore miners often operated below capacity. The battle to remain competitive put increased focus on technology, economies of scale and

industrial relations. By the turn of the century, two companies – Rio Tinto and BHP – had emerged as the dominant Pilbara players.

The millennium mining boom saw unprecedented expansion of Australia's iron ore industry driven by China's rapid growth and insatiable demand for steel. This boom eclipsed earlier ones in the twentieth century as iron ore and coal underpinned a dramatic improvement in the terms of trade. It added considerably to the living standards of Australians and saw, for the first time in decades, new companies enter the Pilbara, notably Fortescue Metals.

While the view from 2015 is one of greater uncertainty, a longer run perspective emphasises the vision and persistence that have underpinned the success of Australia's iron ore industry. The enduring strengths of iron country are undeniable – large, low-cost ore deposits matched with political stability, a skilled workforce, modern infrastructure and proximity to what is still the biggest economic story of the twenty-first century, namely the shift in economic power to emerging Asia.

Future economic development and rising urbanisation in our region will still require a large amount of high-quality steel as emerging economies strive to reach income levels enjoyed in advanced economies. Australia's iron ore industry is better placed than virtually anywhere else on earth to respond to the inevitable cycles that arise along the way.

Unlocking the Pilbara has brought the iron ore industry to the centre of our national economic life. And like many great historical dramas, this one is open-ended.

Bibliography

Avery, David, *Not on Queen Victoria's birthday: The Story of the Rio Tinto Mines*, Collins, London, 1974.

Berkelmans, Leon and Wang, Hao, 'Chinese Urban Residential Construction to 2040', Reserve Bank of Australia, Research Discussion Paper 2012-04, September 2012.

Blainey, Geoffrey, *The Rush that Never Ended: A History of Australian Mining*, Melbourne University Press, Carlton, 2003.

Booth, Connell-Hatch, *The Pilbara Iron Ore Industry: A Report for the Department of Resources Development Reviewing Issues Likely to Affect the Industry to the Year 2000*, Booth Connell Hatch, Western Australia, 1983.

Breaden, P.T. and Parker, J.B., 'Financing the Channar Project', the AusIMM Annual Conference, Perth-Kalgoorlie, May 1989, pp. 137-143.

Bunker, Stephen G., and Cicatell, Paul S., *East Asia and the Global Economy: Japan's Ascent with Implications for China's Future*, The Johns Hopkins University Press, Baltimore, 2007.

Burrell, Andrew, *Twiggy: The High Stakes Life of Andrew Forrest*, Black Inc, Collingwood, 2013.

Callick, Rowan, *Channar: A landmark venture in Australian iron ore: Australia and China forge a bold partnership*, HardieGrant, Richmond, 2012.

Connelly, Ellis and Orsmond, David, 'The Mining Industry: From Bust to Boom', Reserve Bank of Australia, Research Discussion Paper 2011-08, December 2011.

Crawford, J.G., *Australian Trade Policy: A Documentary History*, Australian National University Press, Canberra, 1968.

Creighton, Breen and Forsyth, Anthony (eds), *Rediscovering Collective Bargaining: Australia's Fair Work Act in International Perspective*, Routledge, London and New York, 2012.

Department of Industry, *Resources and Energy Statistics*, Canberra, December 2014.

Duffield, Robert, *Rogue Bull: The Story of Lang Hancock King of the Pilbara*, Collins, Sydney, 1979.

Garnaut, Ross, *Australia and the Northeast Asian Ascendancy*, Australian Government Publishing Service, Canberra, 1989.

Garvey, Nichola, *A Sense of Purpose: Fortescue's 10-year Journey 2003–2013*, Fortescue Metals Group, Perth, 2013.

Gregory, R.G., 'Then and now: Reflections on two Australian mining booms', Centre for Strategic Economic Studies, Victoria University, Working Paper Series, CSES Working Paper No. 50, November 2011.

Hancock, Lang, *The Great Claim Robbery*, The Independent, Perth, 1972.

Hamersley Iron, *Early Mining in the Pilbara: the 20th Year of Hamersley Iron*, Perth, 1986.

Humphreys, David, 'The great metals boom: A Retrospective', *Resources Policy*, 35, 2010, pp. 1-13.

Jamieson, Ronda, *Charles Court: I Love this Place*, St George Books, Osborne Park, 2011.

Kaempf, M., *Politics and Industrial Relations: The Robe River Dispute*, Discussion Paper 15, Department of Industrial Relations, University of Western Australia, Nedlands, 1989.

Kelly, Paul, *Triumph and Demise: The Broken Promise of a Labor Generation*, Melbourne University Publishing, Carlton, 2014.

Kenway, Heather, Stokes, J. and Edwards, P.G. (eds), *Documents on Australian Foreign Policy, 1937–1949: Volume III, January–June 1940*, Australian Government Publishing Service, Canberra, 1979.

Kneeshaw, M., Kepert, D.A., Tehnas, I.J., and Pudovskis, M.A., 'From Mt Goldsworthy to Area C—Reflections on Forty Years of Iron Ore Exploration in the Pilbara', Iron Ore Conference, Perth, September 2002, pp. 41-56.

Langton, Marcia, *Boyer Lectures 2012: The Quiet Revolution: Indigenous People and the Resources Boom*, ABC, 2012.

Langton, Marcia, *From Conflict to Cooperation: Transformations and Challenges in the Engagement between the Minerals Industry and Australian Indigenous Peoples*, Minerals Council of Australia, Canberra, 2015.

Lee, David (a), 'Reluctant Relaxation: The End of the Iron Ore Export Embargo and the Origins of Australia's Mining Boom, 1960-1966', *History Australia*, 10(3) December 2013, pp. 149-70.

Lee, David (b), 'The Establishment of Iron Ore Giants: Hamersley Iron and the Mount Newman Mining Company, 1961–1969', *Journal of Australasian Mining History*, 11, 2013, pp. 61-77.

Lin, Justin Yifu, 'China and the Global Economy', Paper prepared for the China Economic Development Forum on the 20th Anniversary of Hong Kong University of Science and Technology, 23 March 2011.

Lynch, Martin, *Mining in World History*, Reaktion Books, London, 2002.

McIlwraith, John, *The First 500 Million: The Mt Newman Story*, Iron Ore BHP-Utah Minerals International, Perth, 1988.

McIlwraith, John, *Mesa Harvest: Robe River's first 25 Years*, Robe River Iron Ore Associates, Wickham, 1997.

McIlwraith, John and Woldendorp, Richard, *Hamersley Iron Twenty Five Years*, Hamersley Iron, Perth, 1991.

Manners, Gerald, *The Changing World Market for Iron Ore 1950–1980: An Economic Geography*, The Johns Hopkins Press, Baltimore, 1971.

McLean, Ian W., *Why Australia Prospered: The Shifting Sources of Economic Growth*, Princeton University Press, Princeton, 2013.

Neale, R.G. (ed.), *Documents on Australian Foreign Policy, 1937-49: Volume 1, 1937–38,* Australian Government Publishing Service, Canberra, 1975.

Perkins, Dwight H., 'Rapid growth and changing economic structure: The expenditure side story and its implications for China', *China Economic Review*, 23, 2012, pp. 501-511.

Phillipson, Neil, *Hancock: Man of Iron,* Wren, Melbourne, 1974.

Productivity Commission, *Productivity in the Mining Industry: Measurement and Interpretation*, Melbourne, 2008.

Raggatt, Harold, *Mountains of Ore*, Landsdowne Press, Melbourne, 1968.

Reserve Bank of Australia, *Australian Economic Statistics 1949–1950 to 1996–97*, Occasional Paper No. 8, 1997.

Reynolds, Terry and Dawson, Virginia P., *Iron Will: Cleveland Cliffs and the Mining of Iron Ore, 1847–2006*, Wayne State University Press, Detroit, 2011.

Scambary, Benedict, *My Country, Mine Country: Indigenous People, Mining and Development Contestation in Remote Australia*, Australian National University E press, Canberra, 2013.

Shaw, Murray, *Moving Mountains: The Evolution of Port Hedland Harbour*, Hesperian Press, Victoria Park, 2006.

Siddique, M.A.B., 'Western Australia–Japan Mining Co-operation: An Historical Overview', University of Western Australia Business School, 2009.

Singh, Samir and Hoyt, David, 'Rio Tinto Iron Ore: Challenges of Globalization in the Mining Industry', Stanford Graduate School of Business, 2007.

Stevens, Glenn, 'The Challenge of Prosperity', Address to the Committee for Economic Development of Australia (CEDA) Annual Dinner, Melbourne, 29 November, 2010.

Sukugawa, Paul, 'Is iron ore priced as a commodity? Past and current practice', *Resources Policy*, 35, 2010, pp. 54-63.

Thompson, Peter and Macklin, Robert, *The Big Fella: The Rise and Rise of BHP Billiton*, William Heinemann Australia, North Sydney, 2010 edn.

Trengove, Alan, *Adventure in Iron: Hamersley's First Decade*, Stockwell Press, Mont Albert, 1976.

Trengove, Alan, *Discovery: Stories of Modern Mineral Exploration*, Stockwell Press, Mont Albert, 1979.

Uren, David, *The Kingdom and the Quarry: China, Australia, Fear and Greed*, Black Inc, Collingwood, 2012.

Wårell, Lisa, 'A horizontal merger in the iron ore industry: An event study approach', *Resources Policy*, 32, 2007, pp. 191-204.

Wilson, Jeffrey D., 'Chinese resource security policies and the restructuring of the Asia-Pacific iron ore market', *Resources Policy*, 37, 2012, pp. 331-339.

Ye, Qiang, 'Commodity booms and their impacts on the Western Australian economy', *Resources Policy*, 33, 2008, pp. 83-101.

Yule, Peter, *Ian Potter: Financier, Philanthropist and Patron of the Arts*, Miegunyah Press, Melbourne, 2006.

Abbreviations

ABS	Australian Bureau of Statistics
AMAX	American Metal Climax Inc.
BHP	Broken Hill Proprietary Company
BMR	Bureau of Mineral Resources
CES	Central Engineering Services
CHINALCO	Aluminium Corporation of China
c.i.f.	Cost Insurance and Freight
CISA	China Iron and Steel Association
CMIEC	China Metallurgical Import and Export Corporation
COMALCO	Commonwealth Aluminium Corporation
CRA	Conzinc Riotinto of Australia
CSR	Colonial Sugar Refining Company
DFAT	Department of Foreign Affairs and Trade
dwt	dead weight tonnage
EEC	European Economic Community
f.o.b.	Free on Board
GFC	Global Financial Crisis
JILD	Japan Industrial Land Development Company
MRRT	Minerals Resource Rent Tax
NAA	National Archives of Australia
NLA	National Library of Australia
OPEC	Organization of Petroleum Exporting Countries
RBA	Reserve Bank of Australia
RSPT	Resource Super Profits Tax
RTZ	Rio Tinto-Zinc Corporation
YLUA	Yandi Land Use Agreement

Endnotes

[1] Lynch 2002, p. 324.

[2] Statement by the Minister for Trade (J. McEwen) in Canberra on 22 February 1960 in Crawford 1968, p. 522.

[3] Speech by the Prime Minister (R.G. Menzies) in the House of Representatives, 16 November 1960 in ibid, p. 549.

[4] Statement by the Minister for Trade (J. McEwen) in the House of Representatives, 17 August 1961 in ibid, pp. 300-302.

[5] Blainey, 2003; McLean 2013, pp. 229-30.

[6] Report by W.G. Woolnough on the Technical Aspects of Iron Ore reserves in Australia, 14 April 1938 in Neale (ed.) 1975, pp. 350-52.

[7] Memorandum by J. McEwen, Minister for External Affairs, 10 May 1940 in Kenway, Stokes and Edwards (eds) 1979, pp. 277-81. Woolnough thought that 350 million tons was the maximum estimate while 200 million tons was closer to the truth.

[8] Lee 2013(a).

[9] Letter from Spooner to Menzies, 23 September 1959, A425 2003, C70/11048, National Archives of Australia (NAA).

[10] Raggatt 1968, p. 109.

[11] Letter from David Brand to R.G. Menzies, 23 September 1959, A1209, 1961/36 part 1, NAA.

[12] Submission 596 from Spooner to Cabinet, 21 March 1960, A4940, C3063 part 1, NAA.

[13] Cabinet decision 722, 31 March 1960, A4940, C3063 part 1, NAA.

[14] Letter from C.Y. Syme to W.H. Spooner, 2 April 1960, A4940, C3063 part 1 NAA.

[15] Letter from Brand to Menzies, 20 October 1960, A1209, 1961/36 part 1, NAA.

[16] Submission from Spooner to Cabinet, 20 May 1963, A4940, C3063 part 2, NAA.

[17] Cabinet decision 830, 5 June 1963, A4940, C3063 part 2, NAA; Raggatt, 1968, p. 118.

[18] Cabinet decision 1136, 24 November 1960, A4940, C3063 part 1, NAA.

[19] Record of discussions between Struan Anderson and Charles Court, 15 August 1964, Maurice Mawby Papers, 1981.0127, folder 62, University of Melbourne Archives; Department of National Development report, 'Development of exports by B.H.P. from Iron Ore Deposits in Western Australia', 21 January 1965, A4940, C3063 part 2, NAA.

[20] Memorandum from Maurice Mawby to CRA and RTZ directors, 23 October 1964, Maurice Mawby Papers, 1981.0127, folder 62, University of Melbourne Archives (UMA).

[21] Cabinet decision 243, 17 May 1966, A4940, C3063 part 4, NAA.

[22] Duffield 1979, pp. 67-8.

[23] Phillipson 1974, pp. 73-81.

[24] Avery 1974, pp. 139-59.

[25] Ibid, pp. 395-408.

[26] Phillipson 1974, pp. 66-7.

[27] Ibid, pp. 90-93.

[28] Letter from Mawby to Brand, 12 November 1962, Maurice Mawby Papers, folder 60, University of Melbourne Archives; Jamieson 2011, p. 212.

[29] Trengove 1979, pp. 118-20; Memorandum from Anderson to Mawby, 28 August 1962, 'Negotiations with Hancock and Wright', Maurice Mawby Papers, University of Melbourne Archives. CRA yielded to the claim of Hancock and Wright that they had introduced Rio Tinto to the whole Pilbara, West Pilbara and Ashburton area and thus were entitled to royalties even outside the temporary Hancock/Wright/Rio Tinto temporary reserves.

[30] Letter from Mawby to Roy Wright, 9 October 1962, 'Negotiations with Hancock and Wright', Maurice Mawby Papers, University of Melbourne Archives.

[31] McIlwraith 1988, pp. 14-19.

[32] Ibid, p. 18.

[33] Ibid, pp. 14-19.

[34] McIlwraith 1997, p. 12.

[35] Ibid, p. 11.

[36] Ibid, p. 12.

[37] Reynolds and Dawson 2011, p. 201.

[38] The management of Hamersley Iron was led by CRA, Mount Newman after 1966 was led by BHP, Consolidated Goldfields Australia contributed Australian management to the Goldsworthy Associates, and though Robe River's management was initially led by Cleveland Cliffs, it later passed into the hands of Australian mining companies, Peko-Wallsend and North Limited.

[39] Manners 1971, p. 229.

[40] Memorandum from F.S. Anderson to Maurice Mawby, 20 June 1963, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[41] Ibid.

[42] Trengove 1976, p. 1.

[43] Letter from Maurice Mawby to RC Atherton, 26 March 1962, Maurice Mawby Papers, 1981.0127, folder 02, University of Melbourne Archives.

[44] Trengove 1976, pp. 51-2.

[45] Ibid, pp. 52-3.

[46] Jamieson 2011.

[47] Trengove 1976, pp. 53-4.

[48] Ibid, p. 63.

[49] Letter from Mawby to Ross Hohnen, 11 April 1962, Maurice Mawby Papers, folder 60, University of Melbourne Archives.

[50] Trengove 1976, p. 70.

[51] Ibid, Chapter 6.

[52] Yule 2006, p. 247

[53] Lee 2013(b).

[54] Anderson noted that Mount Newman's projected railway was 84 miles longer than Hamersley Iron's but that Hamersley Iron had a better port site. There would be little between the two projects in terms of capital and operating costs. Memorandum from Anderson to Mawby, 11 August 1964, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[55] Submission 752 from David Fairbairn, Minister for National Development, to Cabinet, 'Price of Iron Ore Exports – the Mount Newman Case', 23 April 1965, A4940, C3063 part 2, NAA.

[56] 'Relationship between Hamersley and Mt Newman. Chronological Statement of Facts', n.d. 1966, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[57] McEwen was convinced by complaints from Western Mining Corporation's Lindsay Clark that the Hamersley and Newman contracts were reducing the world price of iron ore, upsetting the price structure and putting the Australian steel industry indefinitely at a disadvantage. Memorandum from Anderson to Mawby, 7 June 1965, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[58] Cabinet decision 989, 26 May 1965, A4940, C3063 part 3, NAA.

[59] Letter from Mawby to Menzies, 1 December 1965, A1209, 1961/36 part 3, NAA.

[60] Letter from E. Trefethen to Val Duncan, 24 January 1966, Maurice Mawby Papers, folder 58, University of Melbourne Archives.

[61] Cable from E. Trefethen to Duncan 8 March 1966 and cable from Mawby to Duncan, 8 March 1966, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[62] Cablegram from Duncan to Madigan, 7 March 1966, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[63] McEwen had been motivated in part by a belief that CSR's withdrawal of Australian equity from Mount Newman would damage the coalition parties in the 1966 Australian federal elections. Cable from Mawby to Duncan, 8 March 1966, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[64] *Australian Financial Review*, 3 April 1967.

[65] Urgent telegram from Mawby and Brian Massy-Greene (Goldsworthy) to David Fairbairn, 21 October 1966, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[66] Rio Tinto Zinc (Duncan) and Kaiser Steel (E. Trefethen) overrode CRA's objection to the Goldsworthy/Hamersley bid to offer to sell ore to fulfil the 1965 Mount Newman contract. As Trefethen told Mawby: 'Good luck, Maurie, we really think this is in the best interests of the Japanese steel mills, the money market and balance of payments problem. The Japanese will end up with one less source, the same number of ports, a lower price and your Government will collect more income taxes sooner.' Cable from E. Trefethen to Mawby, 20 October 1966, Maurice Mawby Papers, folder 62, University of Melbourne Archives.

[67] McIlwraith 1997, p. 17. Phillipson 1974, pp. 165-66.

[68] Ibid, p. 30.

[69] McIlwraith 1997, p. 34.

[70] Trengove 1976, p. 37.

[71] Ibid, pp. 24-5.

[72] Ibid, p. 157.

[73] Ibid, p. 165.

[74] McIlwraith 1988, pp. 35-7.

[75] Memorandum from F.S. Anderson to Maurice Mawby, 20 June 1963, Maurice Mawby Papers, folder 62.

[76] Trengove 1976, pp. 57-59.

[77] Ibid, pp. 82-5.

[78] Ibid.

[79] Hamersley Iron 1986, p. 5.

[80] Ibid, pp. 168-70.

[81] Shaw 2006, p. x.

[82] Ibid, p. 30.

[83] Ibid, p. 43.

[84] Ibid, pp. 35-37 and p. 50.

[85] Ibid, p. 58.

[86] Ibid, pp. 59-60.

[87] Information supplied by David Moore.

[88] McIlwraith 1997, p. 26.

[89] Ibid, pp. 28-9.

[90] Booth, Connell-Hatch 1983, p. 20.

[91] Ibid, p. 21.

[92] Trengove 1976, p. 113.

[93] Telex from Court to Fraser, 25 October 1978, A1209, 1978/745, NAA.

[94] Garnaut 1989, p. 186.

[95] Sukagawa 2010, pp. 56-57.

[96] Trengove 1976, pp. 117-18.

[97] Jamieson 2011, pp. 212-13.

[98] Ibid, pp. 217-18.

[99] Duffield 1979, pp. 132-33.

[100] Jamieson 2011, pp. 210-33.

[101] Phillipson 1974, pp. 183-4.

[102] Kneeshaw, Kepert, Tehnas and Pudovkis 2002.

[103] McIlwraith 1988, p. 92.

[104] Department of Industry 2014.

[105] Booth, Connell-Hatch, p. 91.

[106] McIlwraith 1988, p. 96.

[107] Ibid, p. 91.

[108] Siddique 2009.

[109] McIlwraith 1988, p. 91.

[110] John McIlwraith, 'Miners eagerly wait while Japan ponders iron ore prospects', *Australian Financial Review*, 9 June 1977.

[111] McIlwraith 1988, p. 92.

[112] Trengove 1976, p. 111.

[113] McIlwraith 1997, p. 20.

[114] Ibid, p. 20.

[115] Reynolds and Dawson 2011, p. 229.

[116] McIlwraith 1997, p. 21.

[117] Reserve Bank of Australia 1997.

[118] Breaden and Parker 1989. Callick 2012.

[119] Garnaut 1989, p. 185.

[120] Siddique 2009.

[121] Booth, Connell-Hatch 2003, p. 113.

[122] Stuart Wood, 'In the Footsteps of Charles Copeman', *IPA Review*, March 2000. Charles Copeman, 'Light on the Hill: Industrial Relations Reform in Australia: The Robe River Affair', Proceedings of the H.R. Nicholls Society, Mooloolaba, June 1987, http://archive.hrnicholls.com.au/archives/vol3/vol3-8.php, accessed 15 December 2014; Kaempf 1989.

[123] Productivity Commission 2008, p. 92.

[124] Creighton and Forsyth 2012, pp. 147–8.

[125] Warell 2007.

[126] Lin 2011; Perkins 2012.

[127] Department of Foreign Affairs and Trade, 'Australia's Coal and Iron Ore Exports, 2001 to 2011', July 2012.

[128] Stevens 2010.

[129] Gregory 2011.

[130] Connolly and Ormond 2011, pp. 6-7.

[131] Ibid, pp. 5-6.

[132] Wilson 2012, p. 332. Uren 2012, p. 155.

[133] Wilson 2012, p. 335.

[134] Ibid.

[135] Uren 2012, pp. 153-6.

[136] Ibid, pp. 156-7.

[137] Ibid, pp. 158-64.

[138] Garvey 2013, p. 4.

[139] Singh and Hoyt 2007, p. 9.

[140] Connolly and Ormond 2011, p. 19.

[141] Berkelmans and Wang 2012, p. 1.

[142] Australian Bureau of Statistics, Cat. No. 8412.0.

[143] Burrell 2013, p. 31.

[144] Langton 2012. See also Paul Cleary, 'The boom: Native owners or mining companies: who benefits?', *The Conversation*, 17 June 2011.

[145] Scambary 2013, p. 141. Langton 2015.

[146] Rio Tinto, 'Aboriginal Leadership Development Excellence', 18 July 2014. The Graham (Polly) Farmer Foundation, 'BHP Billiton continues to support Newman and Port Hedland students', media release, 13 July 2013. Burrell 2013, pp. 222-23. Langton 2015, p. 7.

[147] ABC News Item, 'First Aboriginal-Owned' iron ore mine in Pilbara gets environmental approval', 17 March 2015.

[148] *Western Australian Mineral and Petroleum Statistics Digest*, 2001.

[149] Kelly 2014, p. 297.

[150] Burrell 2013, pp. 197-207.

[151] Kelly 2014, p. 313.

Iron country: Unlocking the Pilbara

DAVID LEE

Australia's largest export earner, the iron ore industry has moved to the centre of our national economic life. In *Iron country: Unlocking the Pilbara*, historian David Lee charts Australia's modern iron age from the lifting of the iron ore export embargo in the early 1960s to the China boom of the early twenty-first century.

As this timely and carefully-researched study demonstrates, there was nothing inevitable about the rise of the Pilbara to become the jewel in the crown of Australia's mining industry. A daunting series of political, commercial, financial, engineering and infrastructure challenges all had to be overcome. Later on, the foundation Pilbara projects endured long years of low iron ore prices. Those who fall back on the providential nature of Australia's resource endowment or mere 'luck' to understand the modern success of this vital industry obscure much more than they explain.

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